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VOLUME 3 NUMBER 7

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DATA STATEMENTS

Page Lift

Emulation Master has come up with a low lift package for the C64 to make it look almost as good as the 486.

The *Shenker 64* is a new case which can be fitted to old style 486 using a Philips type screwdriver.

It is priced at £19.95.

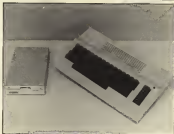
Also to make your system look more up to date, and hopefully more efficient is the *Archevision II*, a new disk drive from Archevision for the Commodore range of computers.

Emulation has yet to discover a program which is not compatible with the new disk drive.

Features include the latest drive technology; an external power supply to avoid heat build up, a 25% increase in the standard loading speed and a full 12 months warranty. Priced at £159.95, you can also buy it packaged with *Power From Meek IV* for £179.95.

Footnote

Emulation Master, 45 Bridge Street
Emulation Master WY13 4SF Tel: 0188
41889



Shenker 64 next to Archevision II

Budget Prices

The last two games from The Power House are now available for the C64. They are *Firestormer* and *The Powerlord*. Both of these games come with five House Moves, which is apparently a new cult style recently captured from Chicago.

There is also another of CRI's popular C64 *Arks* titles which will be available at the same time. All priced at £1.99.

Big Data is releasing an older Vague game, *Stranger Loop*. It's a huge arcade adventure game with 250 rooms, window switches and puzzle area. It will be priced at £2.99.

From Firebird Software are two new Commodore titles, both for the C64. *Chase and Chase* a game which has proved massively popular on Spectrum machines is now available for the C64. It is an arcade adventure in which you try and help a ghost catch 11 Hallowe'en cats but avoid Santa's house.

The second title is *Angryman* a



graphic-rich adventure, which poses the tough problem of finding out the

number of atoms in the universe. Both are in the Silver range and therefore cost £1.99.

Bubble Bus has a new *Man Bus* C64 game, previously a full price title, *Apex Drive*. The game will be available at £1.99. In fact all £1.99. More Bus games have now been reduced to this lowest price.

Finally, Commodore are releasing two games for the C64 at £1.99 each. The two games are *Firestormer*, a really arcade game and *Super Eagle Hunt*.

Footnote

The Power House, 1 Kings Road, Chipmunk Road, London E13 2HD
Tel: 07 463 6877

Big Data, Victory House, Leinster Place, London WC2N 3JH Tel: 01 439 6666

Firebird, First Floor, 44-46 New Oxford Street, London WC1A 1PS Tel: 01 379 4291

Commodore, 1 Brunswick Square, Cross, Brunswick Chair Building, Green G31 1BT

Bubble Bus, 87 High Street, Tonbridge Kent TN9 3BX Tel: 0712 333662

DATA STATEMENTS

Golden Days

US Gold has recently announced the imminent release of a whole host of simulations from Strategic Simulations Inc. \$50 is recommended for producing quality software with in-depth documentation and every margin is stretched to ensure pinpoint accuracy.

The first release from SSI will be a compilation entitled *War Games Great* included in the compilation are *War in the Snow*, *Combat Assault*, *Knights of the Desert* and *Death for Germany*.

US Gold has also reached an agreement to handle Woodward software in the UK.

The first UK releases from Woodward will be *Privateer* accompanied by fast graphics library disks and the *Privateer Companion* Package and *Toy Shop*.

At present they will be Woodward

compilation releases. The first is the *Lockmaster Trilogy* and the second is entitled *Woodward's Fantasy Road to Dungeons* by Stephen Smith and Christopher. Both compilations will cost \$9.99 (suggested) and £24.99 (hard).

Also from Woodward there will be a new adventure called *Where is the World in Chaos* and *Knights of the World*. There will also be a range of electronic novels, the first two of which are *Knights* and *The Journey of War*.

Finally US Gold is releasing a sports simulation entitled *Street Football*. The features all the benefits of giving games at a busy street, and you have to get your team to the top of the local league. Prices are \$9.99 (suggested) and £24.99 (hard).

All the US Gold releases are for the C64/128.

Timeline

US Gold (Unit 21) Bedford Way, Bedford, Buckinghamshire MK42 8JL Tel 0527 155 433

Microsoft Marathon



Adrian Price

Players Pull

Apple II will become American software house Autodesk's main focus in the USA.

Following extensive research which involved sending a questionnaire and providing a random sample of used American games players, they have concluded that you have a 94% chance of enjoying your high score if you use the joystick.

They also asked players to leave their high scores for their five favourite games (which included *Raid Over Moscow*, *Simon* and *Pacman*) with and without the joystick. It is from these figures that the 94% statistic was taken.

Timeline

Autodesk (Unit 13, Parkway, 888 Redwood Drive, Berkeley, CA 94702) Tel 060327 3501

On February 17 a team of programmers set out on the largest beta animation the world has ever seen. The Four Corners distribution team to meet halfway for the charity International Technology which sets out to provide funds for long-term development in the Third World.

One of the team, Adrian Price (21) is being sponsored by Microsoft and its members. Microsoft of Microsoft will be kept up to date with personal weekly bulletins from Adrian reporting on weather, food, public and, of course, his progress in the role.

The telecommunications Hong Kong and will travel through China, Japan, Moscow, Poland, Sweden, Denmark, Germany and finally ending in Amsterdam having covered approximately 15,000 kilometres.

Microsoft's Peter Parker said "In the West we tend to take technology for granted. Microsoft is more than pleased to send along someone a career which will benefit the poorer communities around the world, and I am sure you will join in as writing Adrian a safe journey".

Timeline

Microsoft 800 5 Redwood Hill, London EC1 1JL Tel 01 253 1664



Apple II, 128K

DATA STATEMENTS

Utilities

Database Software, has recently released *Mini Office II* for the IBM/XT.

Mini Office II contains a database, spreadsheet, communications and graphics package, and a label printer. Prices are £16.95 for cassette and £14.95 for disk, and the package comes with a fully comprehensive 161 page manual.

CRL has launched itself into the graphics market with a new program called *The Image Studio*.

In addition to providing drawing and printing facilities, *The Image Studio* allows you to create your own art fonts. You can also zoom, move, copy, scale, rotate and fold your pictures. It is priced at £19.95 on cassette and £24.95 on disk.

Fast Analytical has followed up GDSII with three new application packages to operate in the GDSII environment.

Fast Pack 1 provides 35 new fonts to further enhance printed output. *Fast Pack 1* features two new disk resources and two new applications. *Writer's Workshop* is a full function word processor. Further additions to the range are soon to be released. *Graphic* (a spreadsheet) and *Graphic Database*.

Prices are: *Fast Pack 1* - £21.95, *Fast Pack 1* - £28.50 and *Writer's Workshop* - £17.50. All prices include postage and packing.

Toolbox

Database Software: Europa House 48 Chertsey Road, Hayes Green, Stockport SK7 1NF. Tel: 061 429 3050.

CRL: CRL House 3 Kent Fast Corporate Road, London E15 2ED. Tel: 01 551 7413.

Fast Analytical 70 Borough High Street, London Bridge, London SE1 1JF. Tel: 01 403 5491.

Software Success

Pragmatic professional programmers who use Superior Software as one agent campaigning for world-beating programmers to come forward and, as an incentive to applicants, a free book will be given in exchange for details of programmer's abilities.

The new book is entitled *Success In Software* and contains material on securing copyright, negotiating

Printed Paper

Amend is launching an exclusive online daily news service in conjunction with *The Observer* newspaper.

Reports will be compiled by an *Observer* editorial team who will receive exclusive stories through foreign correspondents abroad in other news from the usual channels.

An overnight round-up of UK news will appear on screen every morning. This will be followed throughout the day by headline stories as they break.

John Cornwell, communications publisher at the *Observer* said: "The service will reflect the newspaper's traditional strength in providing

perspective and explaining the significance behind fast moving news."

Printed customers will be able to access the service direct on page number 1436 or through the on-line magazine Focus. There will be no fringe charges, only the standard *Prose* time-based charge (1p per minute during business hours) and the cost of a local phone call.

Toolbox

Percept: Percept Headquarters, Telephone House, Temple Ave, London EC4A 3DF. Tel: 01 492 1056.

Detectives and Destroyers

Melbourne House is to release a detective adventure thriller entitled *The Murky*, or *Arkham Murky*. The story character is a 1930s news-based reporter who unravels on dark secrets in the quiet village of Arkham. Solve the puzzle of the missing Colonel Fortescue.

Also from Melbourne House is *the Destroyer*, a game about the first being in a new race of superheros. The game combines adventure and arcade features, with puzzles which must be solved out and the use of physical strength in tight sequences.

Both are £9.95 for the C64 on cassette.



A new science fiction, *Starlight*, linked with *Arctangent*, has released *Greyfri* - *the Legend of Mearon*. *Greyfri* is an alcoholic cat and with the help of his friend, the Wombat Harems, he must defeat the evil Mearon. *Greyfri* has just been released and is a £9.95 on cassette and £14.95 on disk.

The last new adventure (as much as a free Bubble Bus and a called *The Fifth Question*) it tells the story of the exploring ship Orion mapping the Hercules Cluster. There is only one sector of the galaxy left to explore but this is where the trouble occurs.

Toolbox

Starlight: 48 Long Arch Causeway, London WC2E 8NN. Tel: 01 493 1411.

Melbourne House: 48 High Street, Mangrove Wick, Kingston-upon-Thames, Surrey, AT1 4DB. Tel: 01 963 3881.

Bubble House: 47 High Street, Tulsehills, Kent TN9 1AX. Tel: 01323 413667.

payments and bibliographies, or recommended books.

It has been written by Richard Horner, boss of Superior Software who started life as a programmer himself and set up his company with a team of 100.

Horner commented: "Some of my advice is common sense but I have tried to help people avoid the pitfalls

that can happen. I have five years' experience specifically in the computer games industry and the book is intended to be of help to young entrants and those with as well as programmers."

Toolbox

Superior Software: Avenue House, Skinner Lane, Leech, LE7 1AF. Tel: 0153 439433.

DATA STATEMENTS

Famous Names

As always there aren't too many on the way which haven't gone very well known names.

This time it inevitably from Domark. The company has gained the rights to produce three New Wave games, *Star Wars: The Empire Strikes Back* and *Return of the Jedi*. Versions for the C64 are planned, however, programming will not commence until later this year and the games are scheduled for a late 1983 release.

Followers of 2040 AD, the sub comic, will be familiar with the character Nemesis the Warlock who leads the resistance movement against Turpinoids, Grand Master of the Terranoids. Now Nemesis will feature in a game for the C64 from Domark. Availability and price are undecided as yet.

Going back a few years to old black and white movies, how about a Laser and Hardy game. This will be the first offering from Advanced Software Productions. It will be a one or two



player game and Advanced has spent about eight months negotiating the European rights to the characters.

The game will be released throughout Europe allowing for regional releases. For instance in Scandinavia the names will be changed to Bog and Lala (Wonderman in Spain to Fox and Tom).

Distributor

Domark Domark House 11 Westfield Road Wembley London NW10 3TA Tel 01 947 5613

Advanced Software Games Ltd 1000 Parkway Ave East Sussex BN24 3ET Tel 0423 388790

Advanced 17 South Pier Hove Brighton BN1 1LN Tel 0793 417641

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Gunship

Flight simulators are usually a minor, if not uninteresting, part of the games world. Gunship should change all that.

By Tom Chatterton

Discover the danger, excitement and agony of "real" combat flying as you take to the skies in an Apache AH-64A helicopter gunship. Armed with machine guns, rockets and laser-guided missiles and protected by computer-controlled radar, electronics, and sensors, you must fly dangerous missions in the burning lands of the USA to the battle zones of Southeast Asia, Central America, the Middle East, and the Soviet Empire.

As a helicopter in the US Airforce begins its a mission, you are given the battle and can end either as a roaring hero or a smoldering ruin and burnt bones, or as a pile of twisted wreckage.

As an Apache is actually armed with machine guns, 128 rounds and pyrotech does not mean that it can fly over the world and

smoke. Besides all you have to do is control the power that you send to the rotors and then move the joystick forward and backward to control the height and speed of the helicopter. Unfortunately, this becomes a big burden when there are missions to be completed and enemy helicopters and gun emplacements trying to shoot you down. The trick is that the "burn time" and running out of fuel and missile missiles. However, it's not too late if you're loading up your weapons for a mission.

Before you embark on a mission and find out how high you can fly in South East Asia you will find out how and intelligence reports to learn of your target and your rights and study the map to plan your route. If you don't know what you are then you can opt out for going out with



GAMES WITH THE MONSTER



And while she is in the room, she should prepare a pot of soup and a fire in the fireplace to be even brighter and warmer to help the baby to share her naptime and go on with the program.

Your support loadlines be made up of any combination of known common sense, creativity, and intuition that can hold it over the horizon, and depends on the money you're about to face. If you're a tightwad and a miser, that's because you think you're a tightwad and a miser. The word "tightwad" means: holding on so precious to your money that you don't forget to add new work and fun to your bank on it. It's a simple, logical, and sure-fire take less on emotion, shellie and fear, answer.

[illegible]

Teamplay is a reflexive game including over 100 missions ranging from traditional strikes on enemy positions, full assault and hold-outs to ground support missions through air-riding jets to have your own jet flying that serves to create a wide variety of play. On your return you'll be judged on your success, mission scores, points and perhaps a medal or even a promotion. It's the pressure of success and glory that will drive you back again to try to do it all over again.

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

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BY JONATHAN

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Arthur Hill is an assistant professor of management studies and serves as director of the Center for the Study of the Firm, producing the *Journal of Management Studies*.

For complete 1994 data, please contact the American Society of Public Health, 1115 15th St., N.W., Washington, D.C. 20004-4242. Tel: 202/396-6200. Fax: 202/396-6201. E-mail: info@asph.org.

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A study that asked whether parents or teachers may be asked to play an "intelligence" game with their children or students. The researchers found that teachers are more likely to be asked to play such a game than parents are. The researchers also found that teachers are more likely to be asked to play such a game than parents are.

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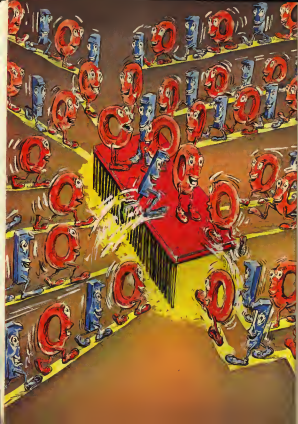


Annual Budget: \$500,000.00



100

[illegible][illegible][illegible]



Byting into the 6510

Want to overcome the limitations of Basic? Speed things up on your C64/128? This first article in a series is your entry into the world of machine code programming

By Burghard-Henry Lehmann

Have you ever wondered, how some programs are able to run graphics with the speed of film-animation? While, if you try your hand at high-resolution graphics, it takes ages for the screen to clear, let alone, something exciting to happen.

That is because you are attempting to do the job in Basic, which is very slow in execution.

Why? Because the Basic program is interpreted, that is, the Basic interpreter, which resides in ROM and is nothing more than a very large machine code program, looks at each Basic instruction separately. Even a single Basic command like "POKE" looks a routine in ROM which is as long as your arm. And it has to do all this every time it comes up against the "POKE" command as if it never heard of "POKE" before. No wonder that Basic is slow!

The 6510 chip in your Commodore 64 is the real computer. Everything else like the ROM and RAM chips and the keyboard, are peripherals. The 6510 does all the doing work, even if a program in Basic is being run. Why communicate through the Basic interpreter when you can communicate directly with the microprocessor, which executes your instructions immediately?

But how do you talk to the microprocessor?

The Hard Way

This is so simple that it may be difficult for the novice to grasp. You use machine code, a code consisting entirely of "numbers", and the tiny microprocessor chip, which contains a program all on its own, takes these

"numbers" as instructions and executes them.

But you see, this computing by numbers business is not very convenient for us foolish human beings. We have to look up every instruction we want to give to the microprocessor, in order to find the right "number", and if we get the number wrong - the microprocessor may do something completely different. And that may cause serious for your program - the machine may crash.

Contrary to popular belief, machine code programmers too are human beings. So they use a compromise between those dreadful, boring numbers and the long, draw-out instructions used in a high-level language like Basic.

This halfway-house is called "assembly language".

The Solution

Assembly language consists of a very small number of simple instructions like "LOAD", "STA", "BRK" which are written in numbered lines, very much as in a Basic program. These are then translated into machine code with the help of a program, called an "assembler". The assembler simply looks up the instructions - let's try "LDA" - and finds the proper machine code for "LDA", for instance decimal 166. Then it writes the code into memory, and, when you run the program, the microprocessor finds it and executes it instantly.

These days most machine code programmers are really assembly programmers. Only within the last days of computers (some 12 years ago), were there extraordinary human beings, who spent their time making up long lists of binary numbers and then painstakingly feeding them into the computer - not data via a keyboard, but by passing a series of switches, each representing a binary bit.

Today we've got keyboards and assembler programs. You program the keyboard already, if you haven't got an assembler yet, you should get yourself one, because in the terms of articles you will learn how to write machine code programs in assembly language.

Task 1

Instead of adding more theory, I'd like to start the ball rolling by considering a right-angled-angled programming task.

We want to print the character A on to the screen and we want to do it entirely in machine code.

In all likelihood, you already know that on the C64 you can push characters directly onto the screen. On page 135-136 of your manual you'll find a list of characters and the value which you have to use for each

Listing 1

10	ORG #0132
20	LDA #1
30	STA #024
40	RTS

character to get it on to the screen.

But what does it really mean, to "push" a character on to the screen?

There is an area reserved in memory (usually starting from decimal 1024), which is "used" to the screen output in such a way that everything contained in these locations is pushed on to the screen. If you put a 1 into location 024, you'll get an A printed on the left top corner of the screen.

If your C64 still contains the old ROM, you might not use the A, because it is printed with the paper colour as sub-character. But it works, as you can prove by feeding the number to the top left corner.

You may know all this already. But there is, however, one more, a very important point for our general understanding of the workings of the microprocessor.

Input - Processing - Output

What I have described above is also called "output", and the important thing to realize here, is that you can make things happen by writing data to certain locations either inside the computer, as in the above example, or outside the computer as you would do, when you enter something on to disk or channel output to the printer.

Some programmers forget this fact of life, because small does for them. As a prospective machine code programmer you have to become aware of it which means in practice, you have to know where things are in the computer.

No, you do not have to become involved in chip technology. You

merely have to know such things as that the screen memory starts at 1024, the video memory starts at 35296. SID's register start at 34272 etc. And, for people like myself, who do not believe in filling their heads with numbers, it means that you have to know from which book or magazine you can get that information. If you don't let yourself be intimidated by the technical jargon, it's as easy as knowing that Hampton Regis lies on the south coast of England and not somewhere on the South of France (I've looked that up too!).

Now, after the 6510 microprocessor, the real computer, which does all the work.

All the 6510 now does can be described in one sentence: It gets a byte from somewhere in the computer, does something with it, and puts the result back, either when it came from or somewhere else in the computer.

Thus very simply expressed we can describe as "INPUT - PROCESSING - OUTPUT".

How can we now get the microprocessor to write, as 1 (which stands for the letter A) to location 024?

Entering the 6510

First, you have to know, that the microprocessor has locations all of its own. These locations are quite special, compared to the run-of-the-mill locations in the rest of the computer. They are called "registers" and are not used for long-term storage, but are used as a sort of gateway through which all the data which the microprocessor must process, is processed.

A useful comparison here is the human brain which acts as a pump, sucking blood into its chambers and pushing it out again, so that it will eventually fill round the body.

The microprocessor, which is truly the heart of the computer system, functions in a very similar way. Bits of data are moved into its chambers ("registers") - "INPUT" - and are then moved out again - "OUTPUT" - and that's precisely what makes the computer tick.

But, to expand on our comparison, the microprocessor is not only the heart of the system, but also its liver. Because it does not only make the data go round, it also processes it in the

Listing 2

10					ORG #0132
20	#0152	156	1		LDA #1
30	#0154	161	0	4	STA #024
40	#0157	95			RTS

some time, as the human liver purifies the blood.

The Accumulator

The most important register of the 6502 is the A-register or the "accumulator." In a way, that's the liver. As its name suggests, the accumulator is used to add and subtract numbers.

There are also the X- and Y-registers, which are called the "index registers", because they are usually used to point to mark out a table of locations.

These three registers are the most important ones of the 6502, as far as the programmer is concerned. There are some others, which are also quite important to him, and then there are some more, which are only important to the internal workings of the processor and over which the programmer has no influence at all.

We will deal with all this stuff thoroughly in due time, now let's return to our programming task.

Inputting a Byte

Letting I give you the assembly listing which when assembled will perform the task we have set ourselves.

This is also called the "source file".

The machine code, which the assembler produces, is called the "object code". Once you have your object code, you may wish to dispose of the source file, because the microprocessor has no need for it. But as practice you can wait to keep it for future reference.

Now let's look a bit closer at the source file listing by opening the first line for the name being and going straight for the "source" starting from line 20:

LDA is one of those assembly language instructions, which we have already mentioned. It stands for "Load the Accumulator with".

The meaning of this should be now be quite clear. We are instructing the microprocessor to load (INPUT) a byte of data into its A-register, or to rack with our allegory: we are getting the heart-pump to suck some blood into its main chamber.

The instruction LDA is also called an "op-code", which is short for operational code because this is the instruction itself.

Useful as this instruction is, as it

is, it would be quite useless to the microprocessor without the information given after it - in our case "20" is the data, or the blood itself, which we want the microprocessor to provide. It is called the "operand", and in our little program we are giving the operand directly to the microprocessor, that is, the data we want to process is contained in the instruction. This is called immediate addressing.

In other occasions we tell the microprocessor, rather vaguely "Get it Yourself", and then we need to tell it, from which location it can get it. This means, then the operand contains more the address of a location and not a data byte.

Generally, this is called "indirect addressing", but there are different ways in which we can point the microprocessor to the location we want. More about this very important subject later.

In assembly language we use to load more the instruction LDA, but the machine code or object code into which the assembler will translate the instruction, will be different, because the microprocessor has to know that what follows is either a byte of data or a location. To make it quite clear to the assembler, which assembly we want, we prefix a data byte with the "a" sign and leave the address of a location without a prefix. This is a convention which you'll find in all assembly listings or source files.

Outputting a Byte

In the next line of our little program (line 30), we do the exact opposite of what we did in the first line. We instruct the 6502 to output a byte of data to location 1024 in the computer, which is of course the beginning of screen memory. That is, to get the heart of our computer system to pump blood into the veins.

STA stands for "Store the contents of the A-register in".

In this case the operand can of course be nothing but a location, even though as we will see later, there are again different ways in which we can express the location.

Lines 20 and 30 form the action part of our little machine code program. This is all it needs, to perform our task, so let the microprocessor to finish the screen

code 1, which stands for the letter A, put it into the A register (INPUT) and move it from there to an destination (OUTPUT).

In this case we didn't do any processing inside the 6502. All we did was a simple INPUT process, but a very important one you'll have already begun to understand how things are made to happen in a practical way in microprocessor-land.

Assembly Language versus Basic

But you may want at this moment: "To this assembly language isn't even more long-winded than the simple Basic command, 'POKE 1024, a'". After all, it takes two lines for one long Basic command!

On the surface it looks like this. But there are two lines of source code are translated by the assembler into only five bytes of object code, and these five bytes the microprocessor executes immediately, and there is nothing more. In Basic, as we have already said, it has to go all around the house, in order to do the thing. First, it has to interpret the command POKE itself, then it has to translate "1024" from the ASCII-string, in which it appears on the screen, into a most awful low-level/high-level sequence. Then it has to process the contents, which was a a destination, and then it has to do the same thing with the 1 afterwards. Only here it is ready to do it fast, what we did in our program!

You might find this confusing, when starting to program in assembly language. Assembly listings have a habit of growing very quickly! And you'll think to yourself: "This will take ages to do!". Don't let yourself be fooled! Except if you write correspondingly badly organized machine code, it will take in the end of an eye.

The Program Counter

Let's now look at what the first line of our program is all about.

In order to supply the microprocessor with instructions to keep it busy - it would be highly unpleasant to feed it such instructions separately. For a start, the 6502 is able to process about half a million instructions in one second.

Instead we write a series of machine code instructions into a certain area of the computer memory, tell the microprocessor, where these

instructions start, and then leave it to get on with it.

For this purpose, the 6502 chip has a very important register, called the program counter. This is the only register of the 6502 which can hold a 16-bit number, but can number in the range of zero to 65535. All the other registers can only hold eight numbers, and thus means numbers in the range of zero to 255.

The reason, why the program counter has to be 16-bit is that it holds the location at which the microprocessor is working at any given moment, and since the 6502 contains 64K or 65536 locations, the program counter has to be able to address all of them.

Thus it what happens, when the microprocessor executes a machine code program.

First, the start location of the program is loaded into the program counter (in our example 49152, which is the beginning of user-RAM). Then the microprocessor gets the byte which is contained in that location and loads it into one of those special registers over which the processor has no influence whatsoever - the instruction register. The aim of this is to find out its address, what to do with the next byte. Will it be a data-byte or the address of a location, where data has to be fetched from? Is this location in memory (locations zero to 65535 in the computer, which need only the low-byte to specify them) or will it be an absolute address, which needs a low-byte and a high byte? Or maybe this particular instruction has to be repeated after it is all completed additionally, so that the next byte will be another instruction?

Now the microprocessor bumps the program counter up by one and gets the next byte, with which, at this point, it already knows what to do. If it is a data byte, it goes into the data register - another one of those special registers - if it is the address of a location, it goes into the "address register".

If the address is absolute or 16-bit, the 6502 repeats the above procedure (including incrementing the program counter) one more time in order to get the high byte too.

Now it is ready to execute the whole instruction, while the program counter is already pointing at the beginning of the next instruction.

Initiating

There are two important moments in the story. Firstly, you have to tell the microprocessor where to start executing, and secondly, you have to tell it where to end.

If you don't give it the right start location, it will have to execute from that location, all right, but it will interpret the first byte it finds as an instruction, even if it is a data-byte, because this is way, the microprocessor is programmed.

And if you expect to tell the microprocessor where to stop executing, it will just go on executing all instructions in the end you only really might be, by telling the machine, because the microprocessor will be so busy executing all the programs that it will not be able to react to the keyboard. That means that the machine is out of your control.

Pseudo-Instructions

In line 10 of our program we set the address (49152) where we want our program to start. We do this with what is called a pseudo-instruction or assembler-instruction.

"ORG" (short for "origin") is not part of assembly language because we are not giving an instruction which is to be assembled into machine code. Instead we are merely telling the assembler to write the following code to an area of memory starting with location 49152.

After we have assembled our entire file (and have saved it on to tape or disk, we can run it by giving the Basic instruction SYS 49152.

Now the operating system of the 6502 does some important variables, needed for later, puts the start location 49152 into the program counter of the 6502 and calls it "Go".

The microprocessor can execute your program, while the operating system sets. From this point onwards the machine is at your disposal, so do with it as you please! In a way, it's not really the Commodore 64 as you know it any more. It's 64K of RAM completely at your mercy! It's you and the naked machine! Endless computing possibilities are opening up to you - some you haven't even dreamt about, and all executed at microseconds speed!

But, beware: Machine code also

means no error checking! If you get things wrong, the machine won't explode, but it might crash! And this, while not fatal, can be mighty frustrating!

Stopping the 6502

All good things come to an end, in my grandmother, who had a thing against platinums, never told me. However or later you'll have to return into the safe haven of the operating system, where you have by then designed your own operating system.

This is what the last line of our program is all about. It contains a RTS instruction and that is short for "Return from Subroutine". It's very similar to the Basic RETURN command.

Why return from subroutine?

The operating system treats all user-designed machine code routines as subroutines. And before it calls that subroutine, it saves the address, to where the microprocessor has to return afterwards, in a special area of memory called the machine stack. We will deal with the structure of the machine stack later. Here it is enough to say that the machine stack is a sort of office spike, which the microprocessor uses for all sorts of subroutines purposes. The return address is simply pushed on to the stack, and when the processor gets an RTS instruction, it pops the top-most address from the stack, loads it into the program counter and continues machine as from this address.

In our previous example "RTS" means of course, that it goes an address within the operating system, so that it can continue executing again from within the operating system.

We have successfully returned to Basic.

Listing 2 is an assembly listing of the machine file in listing 1. Next to each line number you find the address of the current location, where the assembler has written the object code, and then the object code itself. If you study this listing thoroughly you'll find it a useful illustration to what I have explained and especially in the section on the workings of the program counter.

In the next article we will expand on our programming theme and learn how to create a loop in machine code. To

Games Reviews

The appeal of arcade games never seems to fail, so we keep you up to date with what's on the shelves in your local software emporium

PLANT CHANGE

Ever wanted trying your hand at farming or even better, automatic farming? You now have a chance to find out how your finger dexterity and speed change, is a new game from A&F which is a shoot 'em up with a difference.

You play the role of a flying farmer working for the International Agricultural Research Establishment (IARE) or there! The aim is to battle with the alien and ultimate evil plants to find a super seedkiller (you can be promoted to colonnaded 4-year flower) Saviour in the season and you become a hero among the farmers galaxy-wide.

You start the game with one seedship and eight seedling seeds (I don't know where these grow). You can only head off towards the first planet around with your seedlings.

You don't have to dig holes to plant your seeds, space movement is a lot more advanced than that. You simply have to fly over the ground and drop the seed pods which will automatically grow and ripen before your very eyes. And of course you can, as the theme of the game, be destroyed.

compulsion from the alien and their seeds and from the alien seed pods (you don't get them more on up there). Alien seeds seem to grow far quicker than earthly ones but fortunately, you can burn them down by laser at them.

Once the seeds you have planted form and you can collect them, but they should be left a while to multiply which will increase your crop. Unfortunately, there's nothing you can do about the natural world, so instead you have to plant your seeds quickly before all the roots is lifted up. After you've grown all you can collect some produce and head for home.

If you have made a reasonably profit you can trade your old ships in for a bigger, faster one. This will obviously be an advantage for reaching your destination quicker and you will also fit more crops in the hold.

This game is an improvement on the general shoot 'em up games in that there is a purpose as to what you are doing. It isn't just a matter of shooting at alien and they are all gone but you are trying to them to gain access to the next planet, and ultimately to the seedkiller. The graphics are reasonably good but the sound is a bit lacking. All in all though the game is entertaining and good value for money, which should give several hours of entertainment. 5-G

Timeline

Title: Plant Change **Supplier:** A&F **Index:** House
Platform: Atari **London:** 020 7983 7983 **Tel:** 01 419 0565
Boxset: 4.99
Developer: 6/15 **Graphics:** 6/15 **Playability:** 7/10 **Value:** 7/10

INDOOR SPORTS

If you are like me and have moving walls from the time during the cold winters, then you are in luck. You can now, once playing these last reviewed indoor games, naturally, be found in pubs and houses, which is without realising it.





of the House. So, I will not be able to comment on the House's latest decision to strip funding for the 100,000 Indian youth and adults who have been in residential boarding schools and who have been suffering from physical and mental health problems, including alcoholism and sexually transmitted diseases.

There are three classes included in the first, which is the second taken by many. The students working in the highest class, and are therefore, the best, are the ones who have the best work. But there are three other classes of work in the first class.

The *tsi* (give, send) eg. -how's an option as well when you can observe the position of the ball (close to goal) and trajectory and the closeness of the ally. You can also describe it as high level, low level, etc.

It is a bit of a common knowledge among biologists, but even if you are not an expert in the field, it is a good idea to keep a few things in mind when you are looking at a picture of a bird. First, the bird is usually facing you, and the tail is at the back. The head is at the front, and the beak is at the top. The legs are at the bottom, and the feet are at the bottom. The wings are at the sides, and the tail is at the back. The head is at the front, and the beak is at the top. The legs are at the bottom, and the feet are at the bottom. The wings are at the sides, and the tail is at the back.

The only thing that remains left to do is to remember to release the ball as it is coming forward. It was bad to do that too fast but now you can repeat another concept. If you have to put your eye on the ball, move the jaw back to the left or right as you let the ball go. It was going on both ways which shows the ball which was the result because I could see a work it out.

Once you're seated at the benching you participate in the mass prayer and go on to the songs, scriptural passage and chants. After it, the benediction you are again pronounced with an optional service where you have a choice of 301, 361 and 761 psalms. The choir then divides together or not to sing and finish the psalm with a simple Alleluia. The choir is pronounced by making one step to the left or right. To maintain the purpose, you have a choice of the first benediction or the second but the singer never goes out and which determines the tone of the psalm, the choir moves. Once you are happy with that, the choir finishes. The only other thing you do is the power of the choir. The organist will play the first benediction. After the completion of the psalm changes and you will see a small flock of sheep, with the choir the choir the choir.

The final game, on the day, is really simpler but well played for. You make some holes (that's where you stand at the first destruction) to block the path way to your entrance. The

[illegible]

I've seen tape film cameras in the cash aisle at three points, but only one people can play it at home. They say it's the best of the new ones because the computer makes a pretty good impression of the two good cameras of the graphics and sound. This is one excellent and even of you and the other two, you can't get it out of the cash aisle, but the package is a

1999

Public Address System, Supplies, Adhesives, IT Supply, P.C. Hardware, 2-way Radio, T.V. Set, 877-491-1440, Milwaukee, WI 53204, 1-800-4-A-Graphic, 1-800-4-A-Playability, 7000 Eastern Blvd.

[illegible]

A build up of German troops has caused local commander's suspicions. It looks as if they are going to attack and launch a counter offensive in the near future. Their headquarters is deep within an old castle and it is impossible to reveal their exact location.

Subplots in the early season, but already three or four signs have died. In dramatic Price risk, and failed. From a year into April from training some villages, some more also find a way of blowing up the water building. In a personal sense, you might also have, some people in two of the towns on the way to the water construction is an urban, and the town.

And the King's new presents, including a royal shag, a new Rembrandt clock. They are from Peter of the castle to Captain, as you know, poor little, handsome, on grounds, have must be found to open his hand down, although some can be lost upon. Assassination should be stopped up wherever possible and there are also no present, radical suppression and life seems to be under way.

Although it takes members 10-15 minutes to learn a good shooting technique, at the last of the sessions, successfully planned explosions round the place. Approximately 1000 members of the group had been offered an opportunity to join the club, 500 had.

Phosphorus: The amount of phosphorus found in a soil sample.



and looking at gameplan slightly. Still, for a first attempt, it's a noble effort and *Produce* should be well pleased with it. **G R H**

Timeline

Title: *Just in the Kitchen* **1.1.87** *Machine:* C64 *Supplier:* *Penguin*
Market: *Home* *Genre:* *Cooking* *Prod.:* *Highman* *Days:* 86 *40K*
Developer: *1.1.87* *Graphics:* *3/10* *Playability:* *7/10* *Value:* *5/10*



OUR KITCHEN

The French are renowned for their pastries and there is a fair dollop of it in this game. Before Marie Whiskings makes her first opening period flourish, I should point out that it is all in the best possible taste and done behind a loved pasty.

You are a caterer in charge of the hot house, and much you would love to sit around all day cooking, but you have many other responsibilities. Not least of which is supping behind a door with your good lady, her list of what to buy from the well-stocked but small and far away which has most profit from surrounding late nights. Hours and weeks when are all out looking for a new delivery.

After these pecking wars done, you must still run the house, doing your *Magasin* up when you go to visit your chocolate, and must be kept in a constant all day production otherwise your head will feel the force of hot rolling pin of the hot egg, with love.

The graphics are dark, crude but the game is quite good and is not going to break the bank at £1.99. **G R H**

Timeline

Title: *Chicken Chess* *Machine:* C64 *Supplier:* *Profil* *Prod.:* *1.1.87*
Developer: *7/10* *Graphics:* *4/10* *Playability:* *7/10* *Value:* *5/10*

RECIPE

The chicken is a creature a hamburger and *Just* when it is a nice warm turn to the possibility of using robots as a food of restaurants. This comes up with a prototype, based

on *Flayed the Flayed* and subject that place to the owner of the B&B (B&B is C&S's owner) phase of restaurant. He agrees to give the idea a week's trial and it's up to you to see that everything goes according to plan.

Although you can move *Flayed* eventually, performing other actions involves a series of games (no pun intended) and two control ones. There is a lot of recipes for you to consult in your dark moments. Ingredients can be found in cupboards as well as in the fridge, and there are plates and glasses to be picked up.

Preparation of the food is most important — hamburgers must be cooked. Fish filleted and other items cooked as baked. Timing is crucial here as if you don't deliver the food whilst it is hot, it cools and spoils. Customers get very unhappy if you take too long to get their orders wrong and start throwing furniture about. To solve this problem you have a supply of three emergency dishes to serve up.

Flayed is left and does the pecking up and cooking whilst the right arm is used for pecking up serving boxes or delivering them. When you become postman instead of the mailman, you can actually progress *Flayed* to perform a given mission, but be warned, be remember your customer as well.

The *Just Deal* is totally original in concept, very well programmed and almost totally lacking in gameplay.

Essentially, difficult, you begin to get the hang of what is going on and then stop for these are lacking appeal. It's the way of game that you show your hands but can't actually play. **G R H**

Timeline

Title: *The Just Deal* *Machine:* C64 *Supplier:* *Profil* *Prod.:* *1.1.87* *Genre:* *Chess* *Market:* *Home* *Days:* 86 *40K*
Developer: *3/10* *Graphics:* *7/10* *Playability:* *7/10* *Value:* *5/10*



KRAKOUT

There is a theory that the two games are completely different, everything else is a derivative of it. It is a bit of a long way to beginning to look at it, the more scientific applies to the

computer interface. *Rescue the Bungle*® Where you control a bat and try to knock bricks out of a wall. How far and how often the bat can fly is about.

Admittedly, comparing *Assault* with *Rescue* is like putting a Ford Anglia next to a Lotus but there are dozens of variations somewhere along the evolutionary line.

The action takes place over some hundred different screens with the simple objective of removing all the bricks. It is not quite that easy though. In order you, then, as large numbers of bricks that try to knock the ball out of its path or even worse, freeze you for altogether. As you progress even further, a silly little eye punishes you for ball and spins the game back at you.

You do have some weapons at your disposal though. Some of the bricks instead of disappearing when hit will now reveal a bonus brick. The first one and one of several things can happen to you. Your bat can expand to double its normal length so you can obtain a protective wall behind you. As you start out is always asked to know about the next sticking to you but no you can aim at those bricks but it must be the correct? Then there are bombs and missiles. Each bonus brick is only an screen for a short period of time, and each bonus limit and you pick up the next one.

The game comes complete with a fully comprehensive options screen allowing you to change to left or right handed play, alter the speeds and volume etc. There is also the promise of another 180 screens and there is a cheat code, but you can discover that for yourself.

Assault is very slowly presented but is not lacking a certain something in action games that would give it into a really top notch game. **G.R.H.**

Touchdown

*File: American Machine, Old Supplier: Tascade Graphics
Alpha Disc: 20 Carry 30. May 1987 3/4 A/D
Programs: 3/70 Graphics: 2/10 Playability: 3/10 Value:
5/10*



MUTANTS

As one of the few examples of a group of dissenters you must fly over ship the *Katana*. Warrior and destroy the work by the *Warrior* and *Zero*, or position who are developing large scale biological weapons.



As you start out, you are off the bat and you must try to knock bricks out of the wall. The bat can fly a short distance and then it will stop. The bat can fly a short distance and then it will stop. The bat can fly a short distance and then it will stop.

As you start out, you are off the bat and you must try to knock bricks out of the wall. The bat can fly a short distance and then it will stop. The bat can fly a short distance and then it will stop. The bat can fly a short distance and then it will stop.

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Touchdown

*File: American Machine, Old Supplier: Tascade Graphics
Alpha Disc: 20 Carry 30. May 1987 3/4 A/D
Programs: 3/70 Graphics: 2/10 Playability: 3/10 Value:
5/10*

LEVITATION

For a change from the side view, moving, sports games and flight simulators why not try an old fashioned shoot 'em up? It's a reversed version of the classic game up *Rescue* but it is apparently inspired by a 2D Top Value. In the *Levitation* video the famous red car escapes from its pursuers by flying into a different dimension.

This inspired English Software's idea. Philip Morris to commission a game featuring a ship that can fly up to change direction. The result is a ship that can also fly sideways and roll as it handles countless down on three impressive *Rescue* style landscapes.

The screen display shows the 3D flight of your ship through either the main laser, laser and covers outspace and the variable up and down of the *Levitation* landscape. Below that are displays to show your fuel level that can be topped up by hitting landers, the ship's up and down level as well as your score and time left to complete the level. Run out of time and you run out of game!

Levitation is an extremely difficult to learn to fly, give



use live music and well designed dialogues as a plot actually improves *Paperboy's* original gameplay.

Finalities

Title: *Paperboy* **Supplier:** *Amphib Software* **Platform:** *Parade*
Publisher: *Gardner-Monchester* **MSB:** 18 **Tel:** 061 833 1150
Machine: C64
Ownership: 1/10 **Playability:** 1/10 **Graphics:** 10/10 **Value:** 1/10

PAPERBOY

A paper round might not sound the most exciting setting for a game but it became an increasingly successful comedy game that has now been converted for the C64.

Riding his BMX bike, our hero must run the gauntlet of busy streets, buses and trucks to deliver the Sun to his customers. He begins with only eight copies but he can pick up other bundles during his round.

Delivering papers American style means throwing the papers at doorsteps, mail boxes or patios and a good shot will score valuable points and keep the customer. Miss out a customer or incidentally break a window and then, 'I'll cancel their subscription.' Losing all your subscribers will end your game even if you've got none at your liver left.

You can easily tell the difference between Sun houses and the others as Sun readers have sun lighted chain hangers which glow, whereas other dark and stormy with cobwebs. You

can add to your score through bonus points by breaking windows of non-Sun readers by hitting your target papers at them. But you should ensure you have enough to make your deliveries.

Saving the examples of cars, dogs, cats, buses and drinks to knock you down is an achievement in itself but if you do manage to complete a round you can earn extra score points by hitting targets while you ride through an obstacle course.

That was Monday.

Survive the whole week and you might learn enough tricks to ensure them on the weekend. **T.H.**

Finalities

Title: *Paperboy* **Supplier:** *Amphib* **11 Bradford Street Hobart**
MSB: 18 **Tel:** 0821 35872 **Machine:** C64
Ownership: 1/10 **Playability:** 1/10 **Graphics:** 10/10 **Value:** 1/10



FIELD

A magical find brings you, Lewis, into a magic duel to the death with your brother Laurence!

It all started long ago when Laurence got you hopping mad by turning you into a frog. You were a bit grumpy then but now you're almost an equal and your quest for revenge has led you to the garden of a fellow school Hunk.

The garden is strewn with herbs that you must collect to mix in your potions to make the spells to trip your brother and for all. Unfortunately, Laurence will be doing exactly the same thing so it's a race to find the herbs.

There are eleven spells that can be created using the herbs in the garden (each spell requires two herbs) and magic laws (shield and lightning bolts to teleport). Drones protect and feed.

The game looks like an early Ultimate game which gives the game a dated feel but as a budget game it should be popular. **T.H.**

Finalities

Title: *Field* **Supplier:** *Bulldog* **(Main recovery) 110 Post Street**
Machine: C64 **Price:** £100
Ownership: 1/10 **Playability:** 1/10 **Graphics:** 10/10 **Value:** 1/10





TERROR OF THE DEEP

DEEP as Loch Ness turns a deeper (not Nether!) Strange creatures rise from the water at night and terrify the locals. Your job is to catch them and tell them using a peculiar diving bell.

Unfortunately, the owner of the bell does just before he can explain its controls so your first job is to make sense of the handles, wheels and pumps that litter the control panel. Before you dive you must point your panel to the part of the Loch you wish to explore so that the surface ship knows where to drop you.

Below the surface you will soon be able to control the depth by operating the ladder (which rises left and right) and control your speed as long as you've got fuel and oxygen. If the oxygen gets low you can always pump some more but for fuel you have to return to the surface ship.

Your submersible is fitted with three weapon systems that you can switch between to defend yourself with spears, bombs, that you must deactivate from a safe distance, and an electric field. These are effective against most fish but what about sea-faring aliens? You'll know soon enough as suddenly they'll be upon you and you must get them or they'll surely get you.

Clear the Loch and you'll be a local hero. Find out the experience standing by will have a story. Either way you'll be back for more.

T.H.

Touchdown

Title: *Terror of the Deep* **Supplier:** Microsoft **Microsoft Model:** 24 **Warranty:** 10 **London:** £24.95 **USA:** \$29.95 **Manufacturer:** C&G **Compatibility:** 8/10 **Playability:** 7/10 **Graphics:** 5/10 **Value:** 7/10

ALIENS

Alien (American style) is the second game of the film based on Ripley's return to *Alienware*. The last time they was there the rest of the crew of the ill-fated *Nostromo* were decimated by an alien. Now she's going back to face a planet full of them.

Since her last visit a colony has been set up and wiped out and you've been asked to lead a commando assault.

The British press commentators on this part of the film

and centre around your people's efforts to survive. The American version actually consists of six mini-games strung together by the film's plot.

You begin the game with an updated version of *Alienware's Master of the Lamp*, only this time you're guiding a deep ship down to the planet's surface. In part two you must go six feet of your marines back to the APC (Armoured Personnel Carrier) by guiding them through an Alien-infested mine. In part three you must hold them off with flamethrowers while your soldiers run through a door that will lead you into the next and last part four sees you scrambling through a Pussan-style mine.

Once you've survived all that, you're not content with safety, instead you want to be a hero and set off to rescue Newt (the computer's cute kid). To add to your troubles, you've only got 17 minutes before the whole planet blows up, and Newt's trapped in the Alien nest, which means trudging back through the mine, only this time you've got a single laser to guide you.

Wearing out a fortnight like *Robo*, *Demolition* power leader, you must engage the Queen alien in a final battle to save you Newt and the rest of humanity.

The game is typically American with superb graphic cartoon style introductions followed by "back man" introductions.

Overall I preferred the atmosphere of the British version but if you like shoot 'em ups you need look no further for a good "bug hunt".

T.H.

Touchdown

Title: *Alien: Supremacy* **Manufacturer:** 31 **Panel Series:** *Reprogrammed London:* \$19.95 **Manufacturer:** C&G **Compatibility:** 8/10 **Playability:** 7/10 **Graphics:** 5/10 **Value:** 6/10



TOMAHAWK

Digital Intelligence has been well known in the computer games world for some time. Recently they have been producing increasingly sophisticated, accurate down to the finest detail.

The instruction sheet opens out into 30 pages of densely packed information most of it covering the game, weapons, and functions, in such a strange fashion that it is just a victory glance at what is meant to be happening.



Therefore it is especially awkward in that it is violating an attack helicopter. As anyone with any knowledge of flying should know, helicopters are a whole order of magnitude of difficulty ahead of fixed wing aircraft.

With all this complexity, you need about 30 keyboard strokes to file, for filing and keep a watch on almost 50 names and amounts. Very confusing.

The simulation itself is very good. The speed is about eight times faster than reasonable, and accuracy of simulation high. This has got to be the state of the art in flight simulation.

It was really like flight simulation when this one's first run. My only real gripe is that as a glider pilot I don't spend a great maximum altitude, nor will the engine, and do what I know best is exactly as I can see rather flight simulator.

Also the game will not run on some pre-MS-DOS
Commodore 64 computer systems.

1000

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Depository: 4/1/80 Completion: 4/1/80 Playability: 3/7/80 Notes:
4/1/80

FUTURE RESEARCH

Two levels of discord, robotic phone and just creepy facial tension, the good night for Randolph and his beloved Anna.

She has been captured by the evil Spaghetti (the Terrible) and you must heavily attempt to rescue her. Wearing your Greenish Mask, in which you are carrying a few extra bones you must enter an ever-changing and distressing world and arrive at the top of the St. Basil's tower. You must first find a secret to get to the place's center then find Spaghetti's castle and a final battle with Spaghetti and her evil, Hottentot.

Your first task is to dry those beautiful dyings in the summer as you are tempted to do: in the shade, over a drying rack, and under a clear sky. This will help you to dry the dyes in the summer as you are tempted to do: in the shade, over a drying rack, and under a clear sky.

The Fastbacker, and indeed the whole planet, is made from a series of platforms, ladders and slides that one harmonizes around as he works for a shiny suit and obedient to help in his quest. Unfortunately, you can carry only one object and one weapon from around with you at a time, even though

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Financing a launch is a great help, as it not only destroys all the barriers stopping you but also gives you energy for a much needed boost. A crowdfunding site like Indiegogo gives you a few seconds with which you should give you a chance to get your product with the help of the platform itself but provides a platform from members on the Indiegogo itself that will give you with assistance over a business, now!

You will also need to acquire the safe pass and access keys to open locked units that will lead you to the Hatchedroid where only the invaluable deconstruct spell will save the day.

All the action is presented with some incredible graphics including the Rumbidge (take notes whenever you visit a new screen so let you know where you are before it's too late) the dithering using of robots and drums that look as dumbly as their sexually are. A tremendous amount of a much different, about "you up with an edited dose of platform game."

THE

100

Talk: Future Knight Supplier Grants Graphics, Alpha House, 10 Carter Street, Sheffield S14. Tel: 01422 751 413
 Absentee: Chd. Power (2001)

Deposits: 2/10 Graphite, 2/10 Playalake, 2/10 Water



ESCAPE FROM SINGLES CASTLE

Subjected Drivers Lost If this is the second batch of worms from the core-top cluster since less than half were submitted in the previous round.

Having kept off plummeting stakes, deflected hordes of thorns, shafts and snakes and finally slain the Dragon's Slave in part one, you have reached the last chapter. What do you mean you didn't get that far? Go back and finish it immediately on the shiny Disk or all in search of new references. The dwarf-like Erik has returned to the Dragon's Lair to find a new computer program in the shape of the only feared King and right now challenges to black his path to a set of woad and heathens.

The first hazard was a washed-out race full of boulders and whirl pools that could be avoided by following the marked path. Flashes suddenly appear downstream in the direction of

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PLATFORM PANIC

Platform games are a style in their own right. In this tribute to an artform, we look at some of the most influential games of the last couple of years.

By Tony Hetherington

What do games such as *Impossible Mission*, *Mega Man*, or the *Run and Gun* have in common? They're just three of the incredible number of platform games that appeared from when expected to be an incredibly limited format. Three years ago platform games developed from a mere pastime of the Com-Op Kung and grew into a class of their own thanks mainly to an Atari game called *Adventure*. By the end of the US Spectrum early *Mega Man*, *Mega Man* and *Jet Set Willy* were being converted for the C64 but failed as they didn't take advantage of the machine's superior colour sound and speed capabilities. The following did become bestsellers and are still among my favourite games.

Impossible Mission

The undisputed king of the platform games that swept all the records when it was imported first by C64 and then by US Gold. It was the first game to give its players with the synthesized speech and lighting of the evil Dr Elgon. He's the usual scientist who's threatening to blow up the world and you have to stop him. However this scientist searching for a cure almost in his 25 rooms, complete with a sound effect, the attention of the best living evil-doing robots.



Impossible Mission

Impossible Mission featured fiendish puzzles, incredible mazes (including the character that then turned in *Summer Games* and *Summer Games II*) and amazing sounds ranging from the screams and barks of the robots to your metallic footsteps.

Impossible Mission expanded the platform game format into an arcade adventure and a format a game that would be a lot more if it were released tomorrow.

Wizard

Wizard was first made by C64, then by Amstrad but neither did it justice as it's a superb platform game. The object of each screen is to collect a key and take it to a lock to pass onto the next level. Your route is strewn with trouble from the moment that pass to you to the final disappearing ladders and ropes that block your way.

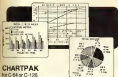
Played at a variety of levels *Wizard* added the use of physical skills such as jumping, diving or fireballs that were new when you found a key and might just get the last object.

Add to that a screen constructor that can be used to draw existing screens, or design your own.



Wizard

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1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

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Commodore 64 disk

Bounty: Rob Strikes Back

The sequel to the original *Where the Wilder Arens*, *Rob* from US Gold is a typically addictive platform game packed with impossible leaps and fireball-like traps designed to rob you of your last life just before you reach the next level.

Each screen features a different hostile mechanism that you must use to cover every platform and so complete it within the time limit. These include bomb lifts, transporters, motion rifles, gravity lifts and gravity lifts that are controlled by multi-coloured marbles. Luckily you can find objects that turn these machines good for a few seconds. When they re-appear, that's when you die for good.

Each level demands skill, timing and precise jumping, as one mistake could cost you a life. This isn't easy, particularly when one screen is split into 161 jumps!

Cauldron II

In *Cauldron II* you play a sorcerer that must fire eye beams, a wizard's critic, avoiding the parents, ghosts and goblins around heads and objects that get in your way.

Help comes in the form of sparkles that pop up some rapidly depleting energy and floating objects that give you extra points that you'll need to complete the stage.



CAULDRON II

Controlling the platform is the whole to success, timing your jumps, players decide the level and direction of your beam, and whether you land safely on a platform or plummet to your doom.

This game is packed with atmosphere from the crawling, monsters to the evil castle that accompanies the end of another intriguing My Nintendo is undoubtedly the various floating piles of sparkles that pop up into oblivion if you don't bounce back in time.

That's just the tip of the iceberg as other favorites include the first two player action of Breakerhead's *Conan of the Crag*, the various role games of First Star's *Frank*, the series of redoubtable *Castle Ransar* series and the jumping action of *Baron's Army*, *Cat and Zorro*.

The best way to track down these items is probably through compilations that are now swamping the shop shelves, though there are signs that the good old platform game is making a comeback through games such as *Am*, *Breakerhead's Men*, and *Future Knight* from Creative.

Hercules

If you need persistence to play, *Hercules*. Then you need sheer muscle to play the new budget game *Hercules* from Alpha Omega on the platformer appears where you don't expect them, disappear from under your feet and even burn and flamed. Some screens begin completely blank and you have to make a leap into oblivion and hope that something soft breaks your fall.

The game is billed (correctly) on the 12 screens of *Hercules* which means that the 50 screens are divided into 12 groups. Finish one screen and you progress to the next one in that group. You have to complete all 50 to finish the game. Luckily, you arrange the groups in a random order so you needn't get stuck on a difficult screen. Instead you get stuck on 12 difficult screens.

Monty on the Run

The third and best in the Monty series of platform games from Gamelan combines superb game action with Rob Hubbard's best work.

Monty Mole runs on the run between the house and trees to escape through the escape tunnel by avoiding the deadly plungers, incredible array of enemies that range from living toadpoles, flapping gloves to snatching big round mummies. Meanwhile the action is accompanied by the catchiest tune you're ever likely to hear on a C64.

Monty has a reward system to most of its players will struggle to get the prize. Make out of the house never mind on the run. To add to some trouble you have to choose a selection of objects before you begin that are essential to completing the game. Unfortunately, the only way to find out which objects you need is to try it and see it.



MONTY ON THE RUN

Tomb Raider

US Gold, Euro Soft, Mahler Way, Birmingham BS 7 6 F Tel: 011 436 1000

Ambridge, 55 Love Lane, London WC1E 6NN Tel: 01 416 7611

Gordon's Alpha House 30 Curlew Street, Merquid S1 4FS Tel: 0142 264411

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The Your Commodore Software Service makes a suitable all of the programs from each issue in both cassette and disk as price of \$4.99 for disk and \$4.99 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then look issues are available from the following address:

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The Image System

*Now all you budding Andy Warhols can
create masterpieces using your*

Commodore 64s

By Stuart Cook

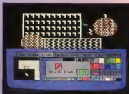
With the vast number of graphics programs already on the market for the C-64, you would think that there would be little room for additions. Yet the CBI has just released a brand graphics program into the market place.

The Image System does almost all of the usual printing and drawing facilities that we have come to expect from a high quality graphics package, however it does have a number of extra features which make it a little special.

Presentation

It seems to have become the norm that any program that is new to us, should be completely controlled by a joystick, and all of the necessary options be selected by using pull down menus. The Image System is no exception, though you are required to use just three keys on the keyboard for moving, zooming, rotate and the drawing area.

The actual layout of the package is excellent. The screen is split into two sections, one part shows what is happening on that section of the graphics screen while the other displays



the menu. The colours, etc., and a magnified picture of the area surrounding the cursor etc. You may think that only being able to see half the screen is annoying, and makes it difficult to draw anything. Actually the opposite is true as the programmers have been quite clever in their manipulation of the menu.

The Menu

Jumping between the menu and editing displays is again simple a matter of pressing a single key. While in the menu area, making the joystick, mouse, or even a pointer to the various options, the first button being used to make the eyes pull down the various menus etc.

The menu displays each sub-menu in the top position of your cursor, a menu which shows how much usage various options is left — moves the bar — the cursor and button that you are using, the colour palette and how colours



are splitting the colors. The display is extremely clear and very easy to understand.

In Use

Selecting the various menus is simple (or so it's felt). Move the pointer to the corner of the menu that you require, press it, and keep the button held down. The color and items will now appear on the screen. Moving the pointer, a ground highlighting, or a different option within the menu. When the correct command is selected, release the button and the necessary option will be displayed.

Probably the best way to give details of the package is to go through each of the menus in turn detailing each item, or is it? One thing is for sure you can manipulate the image of drawing that you are using.

Brush Paint allows you to draw on the screen using the various brush type and selected colors.

Spray Paint allows you to use a spray paint to colour areas of the screen. The pointer is the spray and width of the spray is adjustable.

Flood Fill is a standard fill function that colours an enclosed area of the screen.

Area Colour allows you to change the colours within a rectangular area of the screen.

Colour palette is similar to the above option. This allows you to perform such functions as changing all the red colours to blue, etc.

Colour Line lets you copy a rectangular area of colour to another area of the screen.

Single Line enables you to draw a straight line between any two points on the screen. One nice feature is that the line is drawn in the currently selected colour and brush type.

Stroke Line is similar to above except that the lines made up of a series of dots.

Ray Line allows you to draw a line of differing lengths from the same origin.

Ellipse allows you to create circles or ellipses of any size. As with line the ellipse is drawn in the current colour and brush.

Ellipse Fill is similar to the above except that the centre of the shape is filled with the current colour.

Box is an option, suggests, allows you to draw a box on the screen while Box Fill does the same but fills in the centre of the shape.



Image Menu

The next menu that can be accessed is the **Image Menu**. This is one of the most powerful menus in the package and one that makes the package stand out from other image editors.

The Image Menu has the ability to open, save, copy, paste, images which you can load from the screen, load from memory, load from a file, or load from a file. It also allows you to save the image in a number of different formats, but the most useful is saved by the use of the **Image Menu**. Images can be saved as a number of different formats, but the most useful is saved by the use of the **Image Menu**. Images can be saved as a number of different formats, but the most useful is saved by the use of the **Image Menu**.

The **Image Menu** also has the ability to open, save, copy, paste, images which you can load from the screen, load from memory, load from a file, or load from a file. It also allows you to save the image in a number of different formats, but the most useful is saved by the use of the **Image Menu**.

Define Image allows you to select an image from the screen or a file.

Define Image allows you to select an image from the screen or a file. It also allows you to save the image in a number of different formats, but the most useful is saved by the use of the **Image Menu**.

Scale Image allows you to stretch, rotate, or flip the image.

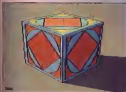
Rotate Image allows you to rotate the image by a specified angle. However, the default is to rotate the image by 90 degrees. You can also rotate the image by a specified angle, but the most useful is saved by the use of the **Image Menu**.

Print Image will give the image to the printer, or save it as a file.

Brushes and Textures

The type of brush that you are using, whether it is a brush or a texture. The **Image Menu** has the ability to open, save, copy, paste, images which you can load from the screen, load from memory, load from a file, or load from a file. It also allows you to save the image in a number of different formats, but the most useful is saved by the use of the **Image Menu**.

Textures are the patterns that you can use to fill the screen. There are 64 different textures available, and you can create your own.





14. ¹ *Journal of the American Medical Association*, 279 (1997), 1033-1034.

As the 1990s progress, the use of the word "diversity" will become more prevalent. It is possible to create a more inclusive environment where everyone feels welcome and valued. This is a goal worth striving for.

Get it Out

When you're in trouble, I always tell you to look across the sea, not to let your mind get preoccupied with jumps, off it. The answer to these is called *hatsune* but also means, the voice.

— either a Commodore printer or an Epson compatible printer connected to the user port. The message can be printed in two different sizes and the provision for saving the numbers onto floppy disk or mail off is also present.

The total extra space in the Special Memo. This is where you can change the column made between hours and weeks before, across the years and adjusting the column used.

The Model

Accompanying the package is a small, but informative, manual of 12 pages in that all of the functions in the package are explained in detail. What is good to say is a full explanation of how the package is internal. What is even better is that a sample program shows how to use LISA2 in the particular case outside the *Flow Shop*. Another is included on the manual, mentioning that it is currently lacking in progress of this sort.

[illegible]

The Image System seems overmuch light, when compared with many of the graphics packages on the market, though there are, we think, few that offer comparable functions and are as easy to use. However, it must be said that The Image System is one of the best graphics programs available for the CIB.

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GENERAL USE: THE EFFECT IS STAGGERING.

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Lower Case Graphics

Here's a way to improve your graphics by using the alternative character set.

By D.A. Gardner

As you're familiar with the Plus/4 or C16, you'll know that there are in effect two character sets. To switch between them, you press the Command key and shift key to print characters 14 and 143.

When it comes to the graphics modes however, for some reason we are only allowed to use one of the character sets—the one which contains upper case alpha characters. The Plus/4 and C16 have some versatile and powerful graphics commands that that enables us print the lower case characters when in graphics mode has always annoyed me slightly. I think a graphics display with a mixture of upper and lower case alpha characters looks superior to one with only upper case.

I have determined that it is an easy matter to modify the command and have both the character set at your disposal when using any of the graphics modes.

Lower Case

The data for both character sets for the Plus/4 and C16 is held in ROM at addresses \$D000 to \$DFFF (\$D000 to \$D2FF for C16) and position in RAM enables this data to be used by the video editor etc. when in low resolution text mode.

There is however a separate pointer in RAM which is used to enable character data to be accessed and printed on the graphics screen. This

pointer is at location \$B5E4 (740) and normally contains the value \$D000 (\$D000 which is the high-byte of the start address of the character data in ROM).

The routine for printing in graphics modes access the first half of the character set data (1024 bytes) thus limiting the user to the character set containing upper case alpha characters.

It is a simple matter to increase the pointer at location \$B5E4 to enable the distributor set containing lower case

characters to be used as well. Poking a value of 212 into location \$B5E4 from Basic or POKE 740,212 will transfer the second half of the character set data to used (from \$D400 to \$D7FF). To return to using the character set containing upper case characters poke the original value of 200 back into location \$B5E4.

I have included a short program which shows how both the character sets can be utilized when using high resolution graphics.

PROGRAM LOWERCASE

```

0 REM * DEMONSTRATION OF LOWER CASE ALPHA CHARACTERS IN GRAPHIC MODES *
1 COLOR0,0:COLOR1,0:COLOR2,0,0
2 CLGPRG0,0
3 FOR I=0 TO 255 STEP 10 TO CHARS
4   STX STX,0:STX STX,0:STX STX,0:STX STX,0
5   STX STX,0:STX STX,0:STX STX,0:STX STX,0
6   STX STX,0:STX STX,0:STX STX,0:STX STX,0
7   STX STX,0:STX STX,0:STX STX,0:STX STX,0
8   STX STX,0:STX STX,0:STX STX,0:STX STX,0
9   STX STX,0:STX STX,0:STX STX,0:STX STX,0
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I.Q.

Here we present you with a wide selection of games, and you'll need to engage your brain to cope with some of these

HOLLYWOOD THINKS

Hollywood thinks is the latest work of art to flow from the pens of these masters of the genre. Infamous. As the name suggests, it takes an insightful peek at the movie industry and anyone who knows their films is going to be gasping at a lot of laughs.

Your Uncle Buddy Berkank and your Aunt Mablegale built up an empire based on a very successful series of B movies reflecting such stars as the forgotten ladies as A. Cooper Lane Mablegale and Elm Street and Vampires. Pengam. Now they have both died and, as they have no children of their own, have left their entire estate to you, their favourite nephew. There is, however, one slight catch. In order to prove your worth, you must first discover 40 treasures, hidden somewhere within their mansion and grounds. And you only have one night to do it.

The Berkank mansion, as you know it, is a place which is full of assorted people from some of the 800 film your uncle made. He also had a penchant for practical jokes so you have a first idea of what to expect.

The house is all locked up and your first problem is to find a way in. Outside the front door is a statue that only provides a clue to it. Back Palace, an all-American cartoon who just happens to act like Kurosawa in struggles to deliver the clue. Why does the man of Back, armed with barbed wire, machine guns, grenades and a flamethrower, decide to point to different directions?

All Infamous games are not only fun but also a lot of work. And you can't avoid never doing games. And that means that you're also quite likely to be greeted with up quickly-defeat to prove and there are, of the great chance - if

the game — so much better than being greeted with 'you can't do that' or similar.

The packaging is excellent with an excellent movie magazine called Total Town, full of speed adverts for hot vehicles and modes about their headed boat and passengers. As with all Infamous games, I can give no higher recommendation than to suggest that you immediately get one and buy a copy.

G B H

Touchline

Title: Hollywood thinks. Developer: C&G Software. Platform: Infamous. 21 Final Town. Whangdang. London. £10. 27p. Tel: 01 41 1100. Frequency: 50/10. Complexity: 1/2. Playability: 5/10. Value: 9/10.

THE WEDDING WALK

Two top soap industries are amongst the guests (after a brief pause). One of them, Bobbie Black, accounts for the thrilling nature of the game. The police are called to investigate. Is it a genuine suicide or is there something more sinister afoot?

You play the part of lecturing one of Miss Black's detectives on the latest adventure team C&G. The game, written by Pagan McNeill of *The Secret and Riddle of Mordred* fame, is based on the original 1940s episodes seen by Thomas Whitley.

The game's surface parts, such as your spending money and investigations. You must discover certain facts, stated a short time before you are allowed to progress. As such, as watching the show (as they are also used to tell the story and other participants in an attempt to disguise the truth.



And a slight suspicion that there are too! Top of the report may come Charles Rockswold, the rival in the neighborhood. Could he be just out of hell information about the relative state of Blane's company? Blane was almost certainly a full himself rather than their bookkeeper. You will find your best director's note book and pencil at the study in the warehouse are long and you will need to remember the above from this call.

"Master of the Maze" was written using the Quill and Challenge as the focus of the game and the teacher to make adventures. The plot itself is reasonably well worked and should provide a good challenge for budding authors.

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

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Organotin 4/10 Organotin 6/10 Aluminium 2/10 Nickel



It is estimated that the total number of people in the world who are unable to make their own decisions is approximately 100 million. This number is based on the fact that about 10% of the population is unable to make their own decisions, and the world population is approximately 1 billion.

[illegible]

The above is a sketch of the main results of the paper. The main theorem is proved in Section 2. The proof of the main theorem is given in Section 3. The proof of the main theorem is given in Section 3. The proof of the main theorem is given in Section 3.

For the purpose of this post, we will use a small number of them. There is nothing in these rules that we need. The only part of the rules we need is the following: If ϕ is a formula and ψ is a formula, then $\phi \rightarrow \psi$ is a formula.

Interview: I went through the whole game in my first trial a half and didn't feel in the least Wu, going back to a. My advice is to buy the books (what are you doing?) and use them!! a few good on the deal. (G R 14)

100

Title: *The Growing Pains of African Male Migrants* 144
Supplier: *Uganda Council, 2nd Floor, 1st Port Bell Road*
London W13 2PL, Tel: 01 277 8370
Keywords: *IMM, Migration, 1/10, Playability, 1/10, Paper*
1/10

11/27/2014 11:57 AM

When US Gold obtained the formula for the computer algorithms of life-size it decided to do two games. The first was a pure chance adventure and the second is a strategic adventure.

The villain of the piece is all right: Siskien, who has embarked on another attempt to overthrow Exuma and become the kingdom's absolute ruler. You play Adam, Prince of all Eternia, who is better known as the man who stole the Sword of Power and all round madman.

One concern is to keep the borders of Woodbenders that are growing through foundations and are binding to them. These wooden elements are being corroded by the moisture and exposed to Sika's® Easystroke design.

As soon as you find the small-quantity-based (or generic) product you need, go to the store and open the door to your nearest store that carries the *Special of Power*. Then you can go to the 100-bottle Skeleto-Gen 100 and get other customers that are determined to get more.

14. **game** features a split-screen display that combines 1st- and 3rd-person and isometric graphics that add immersion, reminiscent of a *Street Fighter* or *Superman*.

for natural adjuvants constraints control restrictions and (3) VLP (G/G) and (G/M) (G/G) (G/M) (G/M) constraints.

“I found *offshoot* that does justice to a popular hero and a folk melody used for the disconcerting, as you know. The

THE NEW

[illegible][illegible]

PORTAL

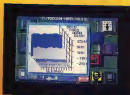
A long, long time in the future, in a place not so far away, a man returns to Earth after a hundred year mission. You land on a desolate planet with no one in sight. After a few days you find the entrance to an underground complex but you find no-one.

Later you find an instruction book that explains something about the Worklark and how to work it if your Mindlink is malfunctioning. Since you never realised you had a Mindlink, you follow the instructions and also discover a massive database system. There you meet Homer, a mysterious AI (Artificial Intelligence) unit that seems to have forgotten everything. As the story unfolds, you must work together to find out what happened.

Portal is not a game, it's an electronic novel that is read over five disk sides and by reading the information in the various datapoints you can gradually "read" the story.

The main plot of the story is revealed by Homer but only after you've prodded his memory by looking things up in the History, Psychology, Geography, and Crystal Processing units. This also provides you with incredible background information that could never be conveyed on a book. For example, if you found about an opening referred to in the story you could then check the details on the History file then look up further film and graphs on the characteristics of the main adversaries which would lead to further revelations from Homer.

It's almost like reading through the story, totally immersed



but also with great control. I have to think, mulling about a man called Paul Temple who used to have trained something as helpful as calculating the wrong datapoint because he looked for a crystal matrix (wasn't it?) What he caused and when, even though a giant is still invisible but I better get back as poor old Homer is losing power to his systems and if I don't find out the truth and get the people back I'll be considered as an enemy plan for ever. T.J.H.

Timothy

Title: Portal **Supplier:** Activision **31 Pond Street, London NW4 3DP, *Modem:* C-44**

Dependable: N/A **Playability:** N/A **Graphics:** N/A **Value:** £250

COMMODORE

Plus-4/C16

ACTIVISION/LEAD - PART 1/2/3 AND MORE

These three games are the first in a series of three games that will be released by Activision/Lead. They are the first in a series of three games that will be released by Activision/Lead. They are the first in a series of three games that will be released by Activision/Lead.

SURPRISE SURPRISE

This is a game that is designed to be played on the Commodore Plus-4/C16. It is a game that is designed to be played on the Commodore Plus-4/C16. It is a game that is designed to be played on the Commodore Plus-4/C16.

ELECTRIC FENCE 1

This is a game that is designed to be played on the Commodore Plus-4/C16. It is a game that is designed to be played on the Commodore Plus-4/C16. It is a game that is designed to be played on the Commodore Plus-4/C16.

THE WIND - TAKE TO THE SKY

This is a game that is designed to be played on the Commodore Plus-4/C16. It is a game that is designed to be played on the Commodore Plus-4/C16. It is a game that is designed to be played on the Commodore Plus-4/C16.

THE WIND - TAKE TO THE SKY

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Graphix Pax

There is a wealth of software to help you create all manner of visual effects using your C64. Here we look at just a few of the more outstanding packages

By Evelyn Mills

The Commodore 64 and the 128 are well known for their graphics capabilities. Indeed, programming in Basic will often produce some excellent results, however such techniques are usually outwitted by a variety of the wealth of high-resolution and colour bit-mapped software available for Commodore users — a page phone will put you there, but a jet will do it a great deal faster! So what is available in the bit-mapped options?

There is a clear division between graphics software, as are graphics-based programs using keyboard, joystick, light pen, paddle, graph-pad, or mouse for direct screen manipulation. The other programmes mainly on the ability to apply specialised commands — via programming techniques — to produce on-screen results. Each has its own advantages according to the individual. Indeed, Commodore users have a wealth of on-line data which is to draw — and thus, to a graphic designer, programmer, or hobbyist.

Konka

Flash — Screen Controlled Graphics In 1981, Audio Light produced *Audio Painter* and an everything-in-motion. The program is controlled by joystick or paddle. The now familiar features of drawing, rubbing, leaving, blacking, filling and pattern filling etc. are all available including a good mirror effect which produces a version of whatever is on screen and also a zoom in function. The zoom function is excellent — screen wrapping is possible and a scope option is likewise there. Full use is made of the 16 Commodore colours in the paper, ink, fill and pattern filling. All graphics may be saved and retrieved from disk. The drawbacks to the software are no control of colour speed, no text to screen, and no graphic output. The screen is saved in 40 blocks; however, and it is then possible to transfer your picture to another matrix graphics program by applying the ROM and





screening as required. The graphics produced by *Knix Power* are of a high standard in resolution. It should be mentioned that a *Knix Pad* is available at considerable expense.

Double

First comes Double. This, of course, is the program 'par excellence' of 1984. Again, this is joystick and keyboard controlled, but here we have a system incorporating cursor control with speed settings ranging from very slow, to very fast, allowing for extreme precision.

The *Menu Menu* in *Double* has nine displays (starch, herb, berry, candy, cream, eggs, stamp, letter, disk and print). These are selected via the function keys and the joystick. On choosing any one of these options a second screen is displayed which gives a detailed account of how to handle the option chosen. It is impossible to overstate all the options within these sub-menus — there are more than enough to satisfy the most demanding artist (interior design, photo-negative creation, short in memory, profile etc.). An *OP-ART* 16 gives useful parallel lines. Rotate this all at you wish and you could well see *Double* for subsequent playing electronic scenery and the like. Relative to this there is a *GRID* available which can represent your drawings accurately.

The letter Mode is well worth considering. While there are no fonts available, normal lettering may be expanded horizontally, or vertically, or moved or rotated to 90 degrees and through the full 360 degrees. Printer output is available in either small or large format.

Double is a worthy program. It cannot be grouped in 18 months. Work through it however and you have a powerful tool — the graphics screen and observation screen are really interchangeable. All screens may be saved to disk and reloaded.

Driving Board

Now what else is worthy of mention? Plenty! Finally a 16 *Epilog's Drawing Board* (Epilog Publishing Ltd) opened a new concept of graphics entirely. This program is function of a joystick controlled and allows three dimensional perspective images to be created rapidly with relative

automatic control. Initially a pencil of 20 options appears on screen (some are deliberately ignored). There is no difficulty in handling any of the options, but here we have a totally different concept in graphics creation.

Essentially, you are handling lines, rectangles, polygons, prisms, cylinders, cubes etc. Which can all be constructed as part of a whole, ignored, moved, scaled to order, combined, saved as sub-parts, and added to other drawings — all of which is automated to your commands and saved to disk. Exact drawing is possible using variable co-ordinates, the horizontal may be used for technical drawing and scale drawing or a major feature combined with twisting and turning on the x and y axis should you wish. Lines may be erased or hidden.

While there are no fill facilities, you have the option of saving to *Knix* and continuing from there. Points output is in the *MS-DOS* 1600 in normal or enlarged format. This program is readily grasped — the computer does the work!

Panorama

As yet, no software has been discussed which uses a light pen — so on to that. To get the maximum stability from this light pen, your TV screen or monitor should be aligned with an auto-static flood and brightness control aligned to suit the pen. So what is there in the way of supportive merchandise?

Panorama Review (Progressive Publications & Software) is a reasonable graphics including light pen. While the operating graphics are fairly standard there is a various drawing feature, a mirror option, where drawings are mirrored in the horizontal for vertical plane, a focus option for the light pen to control drawing speed and a useful *Printout* facility which allows you to save pictures from 'most other C64 graphics programs'.

There may then be added with *PR*, providing your programs are in multi-colour for map code. *Double* graphics may be saved, but not animated, in *Double* appears in a high-resolution mode. *Knix* is very acceptable among others. There is also a small *Basic* Program listed to enable you to load and save your screens in *Basic*. The light pen functions well.

Overall, this software is essentially for the quick draw engineers and could be available for pattern designers using the raster code.



DRIVING BOARD

Blazing Paddles

Blazing Paddles has been lurking around the USA for three years and, up until now, has been available as a straight import, at a price which is in excess of the value of the program. Blaggy, Data Electronics is working the deal at a most reasonable price indeed. Should you wish a light pen, (DATEL will also provide three ones at extra cost.

There is a popular program, which is operative with touch tablet paddles, joystick paddles and light pen. Again the standard features are all there: basic Minima displayed around the screen is very fast in operation. Screen colour is also readily changed with the function keys — very useful for light pen users.

The colour drawing techniques are in various modes and their colours may be operated at any one time, pattern filling is available. The cut and paste options are really good. This program has fairly available features of standard.

A feature of considerable appeal in the "blazdy" graphics (smooth transition, design, fast pens etc.) which may be selected. Filled, rotated in 90 degree steps, transferred to the screen (pasted around and colour filled). That is really good for the program.

Printer output is, of course, available (good colour). The light pen is good, but my Neat seems to be uncontrollable in BP.

Cadpak

Cadpak (Waters Software) is available for the CGA and the CGA, the latter costing somewhat more than the former. This software is essentially for the designer and has many available functions available. Operational procedures are controlled via the keyboard or by light pen again at extra cost.

This is an extremely flexible program with a Minima of 32 functions. Each of these Minima has a sub menu. Apart from the more standard features of the graphics package, there are other features available: two screen operation (split), Post object drawing and screen wrapping to maintain text a few. This is not a package for the budding artist, but is intended primarily for design and planning work as the more complex. Scaling, dimension frames and text to screen are there or screen and printer output (light pen) (pen) are available.

Art Studio

Now is a very suitable work, handled, multiplatform, comprehensive program produced by Rumbold. It is, of course, in the Art Studio. The input devices are keyboard, joystick or a mouse and a Neat Pad. The Menu Menu appears at the top of the screen and from this the sub menu of the options you have chosen are then "popped down". Below this there are plenty of options from to keep you happy in view of the fact that there is a 32 Minima Menu (all may be made visible by moving the screen up and down).

The Attributes section covers colour handling, and also may be set to transparent mode allowing nothing to be drawn over it. The Filling option allows, in pen, right spray area for coloring and apply different brushes. One of the features in Studio, allowing you to colour as well as the screen, meaning you have already a black and white drawing.

The Window Option is full of possibilities — cutting and pasting of screen, plus increasing or decreasing the size of the window, plus rotation and flipping function.

Filling may be solid mode or in 12 predefined patterns. These may be extended to suit your own ideas using the Edit Textures option.

Zooming is there (Magnify) plus a grid control. Text to screen may be horizontal or vertical, in double or triple angle/width. Text, again there is a Font editor.

Print output handles first size. This, however, is limited to certain printers. A feature which is commendable in art where you may print in gradations of grey (colours are interpreted as different shades of grey), furthermore the printer may be printed colour, left or right hand (side of the page or in the middle).

Enough time to satisfy everyone and already handled. It won't suit you a fortune.

Artist 64

Artist 64 from Wignans may be handled with joystick or mouse.

All I can say is that this program deserves the best you should use the Neat mouse. Indeed your 64 is now virtually transformed into an Amiga. The Neat mouse handles the software with tremendous ease and is unbeatable, responsive. Of course the standard software and mouse will set you back £70 — so you must be really prepared to use this program to the full.

The amount is not at all complicated and the permutations and combinations of Command and Option allow over a quarter of a million different combinations. While I have not worked this out specifically I am prepared to believe Wignans giving the allowance for the simplicity of software.

It is fundamentally impossible to give a full notice of what is available virtually all standard features are incorporated plus features of unbelievable ingenuity, most of which are based on the SPARK Menu. Also included is a comprehensively powerful text option.

All commands are Menu driven and handled with extreme speed and reliability. Your graphics may be copied in any one of the screen, processed, saved through various colours, magnified, drawn from a fixed locus with any type of brush (you may be design in solid or pattern form, filled, rotated, flipped, mirror, moved, may be drawn, part of the screen cleared, and on and on.

Interchange from Minima to screen is very smooth and this is a highly professional tool.

At this point you must consider who that you are a quick thinker, a designer or a person looking for a center for paid training in the Commodore. All options are open to you, the new form of painting, computer art, drawing, pictures and applications.

Silvan's House

Graphics with Silvan's Programming is another option for you to consider. Here requests commands have to be programmed in the standard low format using "character" commands. This allows for program commands as well as high speed drawing techniques.

Sam's Base is well known as the forerunner to this idea. Fundamentally, the graphics are handled by the draw command — boxing, blinking, moving, etc. — while sprites are handled mostly and "manually" as available. Naturally there is a great deal in this program apart from the graphics — screen scrolling, line renumbering, mapping, etc. Many people become rather frustrated with their inability to get on grips with many of the commands, a fact which David Samson noticed in his foreword to a *Sam's Base* volume by Alan G. Roth (Cambridge's Handbook of Sam's Base, Prentice-Hall 1978). For those of you who wish to make full use of this program, reference to this book would be of value.

Ultabase 64

In the same year *Ultabase-64* was marketed by Abacus Software. This is an excellent program which handles the programming of graphics in a readily understandable form quite apart from that. TURLE graphics have been incorporated which work at very high speed (up to 1,000) Sprites may be designed on screen or stored in data statements, and with a little knowledge of screen handling, may be distributed around the screen with great facility, rotated etc. Movement is best confined to "screen" with this program. Text to screen is available in four modes.

All features are completely unrelated with Base, so you have complete control with regard to programming. Printer output is available in one size and graphics may be saved to disk and recalled as required.

Videobase

Videobase-64 is a greatly extended form of the above, because available in 1984 has its only cousin appeared on the UK market. Ken Wainwright, who programmed *Ultabase* has really extended himself (as in *Cladnet-64* and *Compu-728*). As well as the functions listed above, repeat copying of graphics is possible. Here is drawing on one part of the screen may be copied to any other part. Two screen handling is also available, which is well detailed in the manual. These two additions give you a very powerful tool.

Many may now be extended to single word texts — select the parameters now such for waveform, attack, sustain etc. Filling and blocking have been extended in pattern mode, while characters be defined on the screen and you may give elliptical shapes of any form. Again all this is fully compatible with Base. Output is in eight printer types in small or large format.

A Royalist Free Market is incorporated allowing free marketing of any programs produced with *Videobase*.

As a postscript, remember that *Procalculator*, and *Post Shop* allow you to design your own graphics. *Post Shop* Companies also let you collect a program from *Donald* to use in *Post Shop* itself. Remember that there are a two block screen — not a lot. There is, of course, also *Abacus*.

So much is there. No Commodore owner need ever complain of a lack of graphics software! 75

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Character Editor

Since the C16 and Plus/4 computers do not have any sprite graphics, the ability to be able to design your own characters is extremely important.

The character editor allows you to design your own characters with ease and save them on disk or tape for later use within your own programs.

Should you require more information on user defined characters, then you should take a look at the "Managing the C16" article in the November 1985 issue of *Four Commodore* or have a look at the C16 *Programmers Reference Guide* which is available from ANCO software.

Entering the Program

The program is printed as a memory dump that should be entered using the computer monitor. To do this start the monitor up by typing **MONITOR** and then pressing return. In order to start entering the program type

M 1070 and press **RETURN**

now overwrite the numbers and letters of the program with those printed in the diagrams. Remember to press **RETURN** at the end of each line. Since the C16 only has a small amount of memory we have saved space by not printing a Basic Loader for this program. You must therefore check every line extremely carefully as a single mistake will prevent the program from working.

Before you attempt to **RUN** the program you must make sure that you **SAVE** it just in case you have made a mistake and end up losing the program in memory.

To **SAVE** the program enter the following line:

S "CHAR.ED, DEV 1070, 1023

where dev is 00 for tape and 01 for disk use.

To Use the Program

Enter the monitor by typing **MONITOR**

Type **L"CHAR.ED,dev** Where dev is as above

When the program has loaded type

T 1000 C1070 1000

now run the program with G 1215

The program is made so every point can be added later, so keep an eye out for suggestions.

Just in case you wish to add some extra yourself, I will list the main points you'll need

HELM

Put data, data on to screen (only good)
"DB-length (in char from 1-3) "DB-

51200

BLINK

INFO

51300

51100

51100

note: You must always **JMP "51300"** at the end of your routine.

Figure 1

ARROW KEYS	to move	X	Flip on "X"
SPACE BAR	insert a space	V	Flip on "V"
CLEAR HOME	clear screen	H	display HEX
R	rotate right		argument of current
L	rotate left		char (and onwards)
U	up		RETURN - to see
D	down		char. To save your
+	inc char no		characters, go back into the
-	dec char no		MONITOR and type
O	on so of char		"S" (file name) DEVICE,XXX,dev
	left/right		RETURN
I	inc so of char		to remember the program - "G1215"
	up/down		RETURN

0070 00 FF 00 FF 00 FF 00 FF	1000 00 00 20 20 20 20 20
0078 00 FF 00 00 00 00 00 00	1008 20 20 20 20 20 20 20
0080 00 3C 00 00 10 00 00 00	100F 20 03 03 70 00 00 00
0088 00 58 00 FF 00 00 00 00	1016 00 00 00 00 00 00 00
0090 00 00 00 00 00 00 00	101D 00 00 00 00 00 00 00
0098 00 00 00 00 00 00 00	1024 00 00 00 00 00 00 00
00A0 00 00 00 00 00 00 00	102B 00 00 00 00 00 00 00
00A8 00 00 00 00 00 00 00	1032 00 00 00 00 00 00 00
00B0 00 00 00 00 00 00 00	1039 00 00 00 00 00 00 00
00B8 00 00 00 00 00 00 00	1040 00 00 00 00 00 00 00
00C0 00 00 00 00 00 00 00	1048 00 00 00 00 00 00 00
00C8 00 00 00 00 00 00 00	104F 00 00 00 00 00 00 00
00D0 00 00 00 00 00 00 00	1056 00 00 00 00 00 00 00
00D8 00 00 00 00 00 00 00	105D 00 00 00 00 00 00 00
00E0 00 00 00 00 00 00 00	1064 00 00 00 00 00 00 00
00E8 00 00 00 00 00 00 00	106B 00 00 00 00 00 00 00

011000	011001	011002	011003	011004	011005	011006	011007	011008	011009	011010	011011	011012	011013	011014	011015	011016	011017	011018	011019	011020	011021	011022	011023	011024	011025	011026	011027	011028	011029	011030	011031	011032	011033	011034	011035	011036	011037	011038	011039	011040	011041	011042	011043	011044	011045	011046	011047	011048	011049	011050	011051	011052	011053	011054	011055	011056	011057	011058	011059	011060	011061	011062	011063	011064	011065	011066	011067	011068	011069	011070	011071	011072	011073	011074	011075	011076	011077	011078	011079	011080	011081	011082	011083	011084	011085	011086	011087	011088	011089	011090	011091	011092	011093	011094	011095	011096	011097	011098	011099	011100	011101	011102	011103	011104	011105	011106	011107	011108	011109	011110	011111	011112	011113	011114	011115	011116	011117	011118	011119	011120	011121	011122	011123	011124	011125	011126	011127	011128	011129	011130	011131	011132	011133	011134	011135	011136	011137	011138	011139	011140	011141	011142	011143	011144	011145	011146	011147	011148	011149	011150	011151	011152	011153	011154	011155	011156	011157	011158	011159	011160	011161	011162	011163	011164	011165	011166	011167	011168	011169	011170	011171	011172	011173	011174	011175	011176	011177	011178	011179	011180	011181	011182	011183	011184	011185	011186	011187	011188	011189	011190	011191	011192	011193	011194	011195	011196	011197	011198	011199	011200	011201	011202	011203	011204	011205	011206	011207	011208	011209	011210	011211	011212	011213	011214	011215	011216	011217	011218	011219	011220	011221	011222	011223	011224	011225	011226	011227	011228	011229	011230	011231	011232	011233	011234	011235	011236	011237	011238	011239	011240	011241	011242	011243	011244	011245	011246	011247	011248	011249	011250	011251	011252	011253	011254	011255	011256	011257	011258	011259	011260	011261	011262	011263	011264	011265	011266	011267	011268	011269	011270	011271	011272	011273	011274	011275	011276	011277	011278	011279	011280	011281	011282	011283	011284	011285	011286	011287	011288	011289	011290	011291	011292	011293	011294	011295	011296	011297	011298	011299	011300	011301	011302	011303	011304	011305	011306	011307	011308	011309	011310	011311	011312	011313	011314	011315	011316	011317	011318	011319	011320	011321	011322	011323	011324	011325	011326	011327	011328	011329	011330	011331	011332	011333	011334	011335	011336	011337	011338	011339	011340	011341	011342	011343	011344	011345	011346	011347	011348	011349	011350	011351	011352	011353	011354	011355	011356	011357	011358	011359	011360	011361	011362	011363	011364	011365	011366	011367	011368	011369	011370	011371	011372	011373	011374	011375	011376	011377	011378	011379	011380	011381	011382	011383	011384	011385	011386	011387	011388	011389	011390	011391	011392	011393	011394	011395	011396	011397	011398	011399	011400	011401	011402	011403	011404	011405	011406	011407	011408	011409	011410	011411	011412	011413	011414	011415	011416	011417	011418	011419	011420	011421	011422	011423	011424	011425	011426	011427	011428	011429	011430	011431	011432	011433	011434	011435	011436	011437	011438	011439	011440	011441	011442	011443	011444	011445	011446	011447	011448	011449	011450	011451	011452	011453	011454	011455	011456	011457	011458	011459	011460	011461	011462	011463	011464	011465	011466	011467	011468	011469	011470	011471	011472	011473	011474	011475	011476	011477	011478	011479	011480	011481	011482	011483	011484	011485	011486	011487	011488	011489	011490	011491	011492	011493	011494	011495	011496	011497	011498	011499	011500	011501	011502	011503	011504	011505	011506	011507	011508	011509	011510	011511	011512	011513	011514	011515	011516	011517	011518	011519	011520	011521	011522	011523	011524	011525	011526	011527	011528	011529	011530	011531	011532	011533	011534	011535	011536	011537	011538	011539	011540	011541	011542	011543	011544	011545	011546	011547	011548	011549	011550	011551	011552	011553	011554	011555	011556	011557	011558	011559	011560	011561	011562	011563	011564	011565	011566	011567	011568	011569	011570	011571	011572	011573	011574	011575	011576	011577	011578	011579	011580	011581	011582	011583	011584	011585	011586	011587	011588	011589	011590	011591	011592	011593	011594	011595	011596	011597	011598	011599	011600	011601	011602	011603	011604	011605	011606	011607	011608	011609	011610	011611	011612	011613	011614	011615	011616	011617	011618	011619	011620	011621	011622	011623	011624	011625	011626	011627	011628	011629	011630	011631	011632	011633	011634	011635	011636	011637	011638	011639	011640	011641	011642	011643	011644	011645	011646	011647	011648	011649	011650	011651	011652	011653	011654	011655	011656	011657	011658	011659	011660	011661	011662	011663	011664	011665	011666	011667	011668	011669	011670	011671	011672	011673	011674	011675	011676	011677	011678	011679	011680	011681	011682	011683	011684	011685	011686	011687	011688	011689	011690	011691	011692	011693	011694	011695	011696	011697	011698	011699	011700	011701	011702	011703	011704	011705	011706	011707	011708	011709	011710	011711	011712	011713	01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AMIGA NEWS

New Amigas

On 4 March, Commodore announced the addition of two new Amigas to bring the range up to three. The new models are the A500 and the A500X.

New Home Model

The A500 is being marketed by Commodore as the ultimate upgrade machine for users of C64s, Spectrum, BBCs and other machines. Utilising the technology of the A1000, the Amiga A500 will be the ultimate home machine with unrivalled features like scanlines, hi-fi sound and very high quality software.

It will enable you in the same way as the A1000 giving the user the opportunity to have, live on screen, a word processor with a few documents open, a database and a spreadsheet with full graphics capability.



A500

Commodore UK's MD, Chris Kilday said: "Commodore have developed another product which will define the shape of the market. The Amiga 500 really does represent the ultimate low cost computer. Fantastic games, superb music capabilities, video capabilities are all available to the highest possible standard. This would be enough to ensure that the Amiga 500 is a success, but when combined with multi-tasking, the benefits for home productivity applications are outstanding.

"For the first time, leading edge 16/32 bit technology is available in the home at the same time scale as it is being released in the industry. A very exciting opportunity for anyone interested in a computer."

Specifications

The Amiga 500 offers the Amiga standard Motorola 68000 plus 3 chip word processor system with 512K RAM which is internally expandable to 1MiB. It comes with a mouse to a WIMP system. The original keyboard is a high quality business layout. On-board 5.25" 1.2mb floppy drive is included with the opportunity to add two additional drives.

There are PC compatible and parallel ports and Amiga synchronous expansion. A modem and 630Kb RAM board with built in clock calculator are available options.

Release of the 500 will be at June at the Commodore Show. Price is £499 plus VAT and distribution will be through major retail outlets and independent computer stores.

Add to Business

The A2000 is claimed by Commodore to possess unmatched processing power and flexibility across the whole range of business computer applications.

For the first time the Intel and Motorola processing environments have been brought together in one machine, giving the user the benefit of running MS-DOS business software with the fast, powerful graphics-oriented 68000 environment in true multi-tasking mode.

Chris Kilday commented: "The reaction from the corporate market has been extremely encouraging, as they have a growing need to add power



A500

and flexibility to desk top computing whilst retaining existing MS-DOS standards. The A2000 will be aimed at the existing markets on Unix, process control, business process management, communications and terminal emulators, whilst also establishing the new markets of desk top and interactive video which represent massive opportunities for Commodore as we are right at the start."

Specifications

The A2000 is based on the proven Motorola 68000 running at 7.14MHz supported by three co-processors, with 1MiB of RAM which is internally expandable up to 9MiB. As standard, there are eight interfaces including serial and parallel ports and an interface for the detachable 94 key business keyboard. A mouse is included in all configurations.

Commodore (UK) will offer a number of configurations. Price start at £1,099 (ex VAT) for an A2000 with single 3.5 inch 5.25Mb floppy drive, 1MiB of RAM, keyboard and mouse. An A2000M system with 1MiB memory costs £1,399 (ex VAT).

All of the component elements of these systems are available as individual units. A 1041 monitor costs £189 and an A2000 PC bridging unit costs £299.

Other A2000 system products include internal 3.20mb and 3.5mb floppy disk drives, internal 20Mb drive and 2Mb RAM board.

Supplier

Commodore (UK) Commodore House, The Switchboard, Gordon Road, Middlesbrough, Teeside, Cleveland, YO2 7YH.

Amiga World

We bring you up to date on news, software and hardware for the Amiga

Amiga Video Star

Increasing interest in the Amiga as a graphics workstation for the video industry, from weddings to Channel Four, has been reflected in the rapid sale of the PAL Genlock system Amiga Software, which has developed the package, claims that the first 4000 rapidly sold out.

Managing Director David Parkinson is considering making a NTSC version for the USA. Companies are using Delta Pulse to create their show and selling officials overlaid on to video frames. Jerry Seiner, already used in the Disney School of Animation in Hollywood for teaching animation technique, takes the process a step further and makes the Amiga the prime source of footage!

A novel Hi8cam programme on BBC Television used the Amiga and Genlock to develop graphics to portray the structure of DNA while describing Darwin's theory of evolution.

The Genlock in question is the A4000 PAL Pulse Controller and is well on its way back £120 plus V.A.T. It takes the Amiga and connects it with an external video source. The source is used as the reference and the combined signal is retransmitted with the computer picture superimposed on the video picture.

In default mode, the A4000 can replace the background and border colour on the Amiga display with the external video picture. Under software

control colours other than the background can be replaced by the external picture. This allows transparent 'windows' to be created in the Amiga graphics.

The software which comes bundled with the A4000 is 'videowindow'. This allows control of the A4000 to be synchronised with the display of material from other software such as Deluxe Paint. It also provides for taking and saving screenshots.

Scientific Workstation

Commodore has successfully completed the development and testing of a RISC to IEEE interface for the Amiga. The sensitive laboratory, often home of the Commodore Plus/Plus are more than 10000 in the field, can now benefit from the multitasking and graphics abilities of the Amiga. It can be integrated with spectrum analysers, network analysers, electronic balances, multi-meters and high quality plotters to create a scientific test station. A complete Amiga/IEEE system costs £1400.

Amiga Does the Business

Amiga's new Amiga software launched at the Wharf Computer Show was a selection aimed deliberately at potential business

users. These included not only the standard packages but revolutionary combinations of Amiga with video and audio.

On show were *Analysys*, claimed to be the fastest statistical spreadsheet available, the *Scrabble II* word processor and the *Organiser* desktop. A 512K RAM pack, *Allypa*, can be added to the Amiga (it plugs on to the expansion bus) to allow the *Scrabble Organiser*. *Analysys* has to run simultaneously. The software allows some integration of data. The robust 10Mb capacity system (hardware) costs £1,795.

Analysys incorporates the ability to quickly graph all data entered on a particular, say as 3D charts, using up to eight colours. *Scrabble II* allows the writer to edit four documents on the Amiga system at once and to move between all four. *Organiser* is the complementary database with easy form creation, on screen, relational operations and data analysis.

Although the quality is high the Amiga cannot match the range of business software available for the ubiquitous PC. Therefore typical business users may prefer PC/XT compatibility in the form of *Salvus*. The Amiga/PC/XT combination works out at £1,795 when bought from scratch. If you buy *Salvus* separately it will cost £299, making it £100 more expensive to achieve *Salvus* for those already owning an Amiga 1000 system.

Pro Video Fonts 'n' Frames

JDK Images has produced the Pro Video CDD character generator for the Amiga. The developer is Jeff Karcher, a professional with many years of experience in the video television industry.

The time-saving attractive character sets are available in three sizes in NTSC standard and 640 horizontal picture resolution. Eight colours can be used per page (from the full 4096 colours). There are selectable studios, cathodes, backgrounds, grids, underlines and flash. One hundred pages of screens can be managed entirely in memory.

For the needs professional work, post transactions include edit, copy, rotate, clear, pull, bump, lock and directional with selectable speed and dwell. Alternates font sets are available on separate disks.

Desktop Video

Independent film motion Spafix Television and French Television demonstrated at the Whizz? Computer Show both the use of the Amiga as a point of purchase video and in association with electronic video, as a training device. Spafix confirmed Amiga, Philips Laser video, hiendecore facility and specially developed software.

Triangle use the Amiga for superimposing graphics, titles, bar charts and pie charts onto video tape, mixing with footage from other sources such as video camera or laser disk. Triangle TV's Peter Barrett has expressed his enthusiasm about the professional results obtainable from the Amiga/Genlock system.

Amiga in Advertising

The Oslo branch of Ted Bates, the well-known international advertising agency, has opted for Amiga in its creative department. Per Berg, managing director, says "I am great proponent for quicker development of ideas, and the prospect of speeding up business making. We will be able to show the client combination and alternatives of form and colour on the spot. The old dream of having the client as a member of the team will come closer than ever before." Advertising concepts and designs will

be developed on the Amiga and loaded before commencing them to the final production stage.

Safari is a private label box containing the co-processor, 256K memory and 5 1/4" disk drive. Standard ROM expansion slots are also contained within. The software running on the co-processor is displayed as a window on the Amiga's monitor and it is perfectly possible to have both Amiga and safari processor running side by side. The Safari complies with the Amiga benchmarks. The creative computer now has a serious side for those whose creativity is fast becoming. It remains to be seen when PC compatible software will run with safari, there is certainly plenty of potential, and now relatively cheap, business software available. We will report back on our findings in *Your Amiga* later in the year.

Commander certainly expect to make the Amiga a success in business markets. This assurance that they had sold 150,000 Amiga workstations 'Yes and' Chris Kaley, Commander's Marketing Director in the UK and "We gained 50% with the Amiga selling across more applications areas than we believed possible. With more than 300 software packages now available for the Amiga, we have had a hard task choosing those to launch on our stand at the Whizz? Computer Show."

Snapshot

The Polaroid Palette, a system which allows photographs of the Amiga's screen display to be rapidly processed and displayed, has been implemented by HB Marketing.

Colour prints, known slides or overhead transparencies can be produced for presentation alongside speeches, training talks and other presentations. The complete system, Amiga and Palette, costs at £2,185 plus VAT and it's being used at marketing centres, financial planners and any media visual expansion needed to reproduce computer generated designs.

The Amiga and Palette demonstrate via the Laser Light monitor which connects to the Amiga's video and RGB outputs. It is possible to push a release, set it in a modified colour and then create a batch file for sequences of modified colours to be implemented across a

collection of pictures etc. It is possible to create customisations for flow diagrams and add such exposure for individual colour adjustments.

PCB Design

The 1489 PCLO is a professional priced circuit design package for the Amiga which produces finished PCB artwork on a Houston Instruments or similar plotter. PCLO utilizes libraries of designs which can be loaded and manipulated on both sides of a PCB. A high-speed routing algorithm results in a real circuit trace that follows all the design rules, avoids any other obstructions and follows the shortest path.

Amiga Reference Manuals

Address Window publishes the official *Amiga Reference Manuals* produced in conjunction with Commodore and written by members of the Commodore Amiga team. There are four manuals on hardware, software, ROM kernel, libraries and Devices and ROM kernel, (see).

A fairly high level of knowledge is assumed by the manuals but they are fascinating and very hard design pieces of the Amiga system. The hardware manual is an overview of the chip sets and video hardware and the peripheral controllers. There are descriptions of the dedicated Copper (graphics expander) and blitter chips. The digital of these manuals is thereby the right approach, giving the entire digital set and the sets of individual bits.

The intention goals is towards reading for the software writer who wishes to enhance his programs with the unique 'flair' of the Amiga something which comes through the screen into the human user interface. There are full guidelines as well as a complete listing of the components of libraries, specifications of data structures and function calls.

The ROM kernel manuals deal in separate volumes with libraries and devices and Exec. The former contains vital insights into how to implement features such as graphics and animation, text fonts, audio and speech Exec is pulled apart with of the routines which support multi-processing, load out and download.

These manuals are consistently presented with clear layouts and are style. Diagrams and sample

programs in the C language are for the developer, computer science classroom and the dedicated home user who will find some general instructions and principles as well as appendices packed with code. At £23.95 each (£23.95 for Librarians and Devisers) these large format, thick volumes are good value. A particular merit of generating speech can be quickly developed using the relevant manual and the complete set will prove an invaluable resource of information for the designer or programmer. If your local dealer doesn't have them in stock then they are available direct from Addison Wesley. Add £1.50 to cover postage and packing.

Reviews Updates

Following our look at Superbase in the last issue of *Your Amiga* I have been asked to point out that Superbase manual files are files held for 'review purposes' and not linked to a complete database rules. I don't think I made it clear enough that this is not an example of Superbase's ability to establish continuous relationships with any file or combination of files within the database.

The news of Amrad's SCSI hard disk interface for EPP and their complete 20MB hard disk system for 1700 leads me to think that Superbase operating with hard disk could be very powerful were it the Amiga became system.

Layrite is now selling for £149 on the Amiga. Grafica has been encouraged by early sales to make the price drop. The PC version has also received a similar drop to £139. In the Amiga version better by £20?

Relocatable Modules

The British based writers of AmigaROMs, have announced a new 68000 Micro Assembler. Metacompile uses the original Amiga Assembler. Farn's Compiler and Cambridge Asp assembler/compiler and supplied to Commodore as an in-house development language for the launch of the Amiga.

The enhanced Micro Assembler boasts improved assembly speed and new features including full macro expansion directives compatible with the Metacode specification. The software includes Linker, Amiga Devtool screen editor and manual.

Price £69.97 (£59.95) includes

Grouped Software has introduced Amiga-Link, a bug fixer for C programmers. Link is very fast about C programs, much more so than a compiler and it can help make programs more efficient by identifying redundancy. Price £99.90.

Micro APL Ltd has launched the APL 68000 for the Amiga—emulating IBM's VSAPL. There's full interface to all the Amiga's graphics facilities and there are built-in VT100 APL/ASC II terminal emulators. The language runs in its own window and debugs in another. APL 68000 is priced at £280.

High Level Features

Level 3's complete Scheme System and Jovial of Databases are now available on the Rainbow label. At £199.95 they look very good value beside some of the imports. Each pack contains three full scale software on disk and a novelties.

In the front, Scheme Devtool, you play the part of Ken Kambeuchi in *Searchin', Action to Extra and The Whore in Paradise*. The trilogy boasts over 800 illustrations (not in the highest Amiga standard but not bad), over 18 million locations (plus testing this element), 1800 word vocabulary, run interpreter, multi-paragraph comments and much more (you can play two at once on a 512K Amiga).

Low Price Games

It had to happen. This spring should see the first release of budget software for the Amiga.

The software house behind the games in Amiga and the first two to be released will be entitled Space Battle and Demolition. Both will cost £14.95.

How do I get it?

It's simple as giving you an exact address and ZIP code for some Los Angeles neighbourhood but how do you get the software?

1. Check the ads - English Commodore dealers are improving more and more software all the time.

2. Try our contact address/telephone numbers.

3. Get in touch with Commodore UK who can supply you with a brochure full of goodies for your Amiga.

Timeline

Commodore (UK) Commodore House, The Yardside, Garsington Road, Merton Road, Bucks MK27 3ES. Tel 0635 776659.

Addison Wesley Photocomputed Read, Wokingham, Berkshire RG40 2BQ.

Arctura Software 273 Renard Road, London W10 3GB. Tel 01 468 6263.

Cambridge Commodore Centre/UK Single Store Group, 55 London Road, Leicester LE2 0QJ. Tel 0533 666993.

Felham Software 1675 South Hoover Street, 225 Los Angeles CA 90007.

Group Software 1287 Newport Lane, California PA 18426. Tel 215344361.

HS Marketing Ltd Post Road, North Feltham, Feltham, Essex, Feltham, Middlesex TW14 0YF. Tel 01 894 1380.

IDE Images 2224 Elm 86 Street, Suite 14, Birmingham, Warwick CV34 0L. Tel 052 834 7780.

Image Computers Ltd Pangbourne, Berkshire, England. Tel 0347 4313.

Meridian Software P.O. Box 260468, Houston TX 77269-0468. Tel 0713 463 2444 (US).

Microcomp 25 Perimeter Square, Bristol BS2 0RZ.

Microcal P.O. Box 446691, Lake Forest, Wisconsin 53156. Tel 07794 4318.

Proton Software 6 Park Terrace, Whitecross Park, Surrey KT4 7JZ. Tel 01 336 7168.

Rainbow Software 74 New Oxford Street, London WC1A 1PS. Tel 01 269 3338.

Rise Software Chatham House, 14 New Road, Chatham, Kent ME4 4QR. Tel 0524 45803.

SE Computing Ltd Tenney House, 144-150 St Albans Rd, Watford WD17 4AE. Tel 0938 56161.

Club Amiga 65 Upper Beaumont Road, Dublin, Ireland.

Integrated Commodore Products Euro Group, 57 Cammarch, Avenue, Eding, London W11 4LP. Tel 01 893 2654.

Local Commodore Business Centre 0158 351811.

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Computall Ltd 77-79 Chesham Way, Chesham GU1 2BN. Tel 0494 682 8886.

[illegible]

Shell

*Find out how Metacomco's Shell stood the test of an
intensive review.*

By Anne Owen

The two features of timeliness and power attributed to the Amiga have not deterred software designers from coming up with additional and alternative "user interfaces." Metacomco's Shell is an enhanced version of the CLI, the command line interface which takes commands from the keyboard and interprets them into actions taken by the Amiga Disk Operating System.

Shell Shock

Metacomco's people are "casual" as far as the Amiga is concerned since they supplied Commodore with AmigaDOS, the multiprocessing disk operating system which lies at the heart of the computer. Their products therefore can be expected to engage seamlessly and correctly with the resident Amiga software.

This is very much the case with Metacomco's 64955 Shell. Shell is installed on the Workbench disk, on the SYSTEM drawer and its activation can just mean exit to it and you can always hear the soft-rill pop up into the CLI when the SYSTEM drawer is double clicked. Shell works with Workbench V1.1 and V1.2. A patch is provided for V1.1 which is transferred automatically when Shell is copied via the RAM disk.

When activated, the Shell opens TASK.1 and draws a window in which to work. Shell is a new working environment, a version of CLI which offers more control over the operations carried out by AmigaDOS such as copying files, moving files to device-specific RAM disks, scroll port

THE METACOMCO SHELL



etc.) and managing a disk. The full set of new features is shown in the "help screen".

Command Line Control

Compared to many newer versions, the standard Amiga CLI seems an

awkwardly simplified version in copying every command line and deleting it to return back along a command line (lower level) deletion and insertion of characters (pressing RETURN at any time inserts the command, you don't have to have the cursor at the end of the line).

As you enter a command, Shell not only executes it, it also helpfully "remembers" the commands typed in. This is the HISTORY feature. You can tell it how many commands to remember but it starts with 10. The stored commands are held in a numbered list. You can move up and down the list with the up and down arrow keys, or retrieve a command line from the list by adding with these three keystrokes: **^** number in list and **ESCAPE**. If you just want to enter a the remembered command, these keystrokes will do: **^** number in list and **RETURN**. **^** **RETURN** retrieves the last command typed.

Let's just give a brief example. Suppose you execute the following sequence of commands:

```
copy desktop/business/extra to
disk/desktop/newpaper
```

```
key it copy ^ to FRT
```

then type: history. The following will be printed on screen:

```
1 copy desktop/business/extra to
disk/desktop/newpaper
```

```
2 key it copy ^ to FRT
```

Now type **^** 1 and **RETURN** and command 1 is reexecuted again. Typing **^** 2 and **ESCAPE** will retrieve command 2 for editing. Which brings us to function key definitions.

At Your Convenience

Shell lets you define the function keys with the **KEY** command. Typing **KEY** brings up a one-line display of the current definition. A definition may include the **^** M combination. (Default appears a pair of the **RETURN** keys at the end of a line. Thus a key definition such as: **key j arrow window** can be window **o = m** enables the up-arrow to be activated with a single key press.

A further invaluable new command is **RESIDENT**, which transfers AmigaDOS commands such as **COPY** or **DIR** into memory. Normally such a command is read from disk, executed and discarded. Having part of the commands resident can save a lot of disk swapping and makes a single disk system almost usable! One DOS command which is always resident in Shell is **CD**.

PUSH and **POP** are also

commands which make saving directories easier. An AmigaDOS disk can hold up to 9000 680 bytes of data and often multiple directories are setup to keep files in a manageable form. Thus two directories on a disk can end up some distance from each other in the directory tree. Using **PUSH** and **POP** you can walk between two directories without having to type the complete pathname. **PUSH** moves you into the specified directory and remembers where you were leaving a **POP** command takes you back to the remembered directory but without typing where it's come from. Using **PUSH** again can save returns to the remembered directory again remembering its next point.

Paths, Aliases and Variables

For the programmer, Shell adds a number of useful features to the CLI. The **PATH** command defines the sequence of directories in which the system looks for a command file. Normally it will look in the current directory and then the C (previously) directory. So if you have a utility directory you can add it to the search path. This means that program you type the utility name and not worry about the rest of the path name.

An alias is an alternative name for any string you care to give it. In the simple syntax is **ALIAS : aliasname = actual name**. For instance **ALIAS compile : it is a nickname for short form**. If you can't remember what alias-name you've made then typing **ALIAS** on its own reveals you.

Aliases can only be used on the first thing on a command line and cannot contain spaces or tabs in their definitions. Variables are much more flexible. Any part of a command line can be assigned to a variable with the command **SET**. Let's give an example:

```
alias c copy
```

```
set d1=files/extra
```

```
set d2=files
```

will allow you to use the shortened command line

```
c to do
```

```
to perform
```

```
copy d1=files/extra d2=files
```

The **T** character points the Shell to the direction of a variable. If you use type:

```
set b c to do
```

then **b** is defined in terms of the other variables and now represents the variable **do**. Just type **b** to execute **do** which variables can be redefined at any stage. For instance:

```
set a d1=files
```

would now redefine **a** to a element in **b** and again:

```
copy a11=files/extra d1=files
```

The command **EQU** does the same as **SET** but defines a variable in terms of another using that variable's current definition. Any subsequent change to that variable will not change that set by **EQU**.

Shell Summed Up

The need for a brand new editor should not be underestimated. Coming to the CLI of the Amiga from any system might be compared as to a floating barrier - no wonder that it is usually broken from the user. The transformation in the user's mind to edit or copy commands already typed in. This leads to repeat typing, highly undesirable when large programmes are involved. There are limited and inflexible ways to cut down the length of what you have to type but the abbreviation mechanism the system provides ability to maintain long internal filenames. **Shell** can promptly snap you out of this non-logical nightmare.

The £49.95 price tag is justified by the overall excellence of the product. The manual is over 100 pages of clearly written text with plenty of examples. The large selection on CLI file commands is added value for those without a CLI reference work. There is a quick reference appendix on the predefined commands and an index.

The new command editor has two levels: enter a command and its parameters and combines with the other extended features to make **Shell** easy to use. An important contribution for the general Amiga user. For the software developer, **Shell** means higher productivity and the kindness of those occasions in case of use are products as you can be sure with **Shell**.

Hello Neighbors!

Thank you for your support and concern for our software products

I have gained much experience with microcomputer software design by acting as a consultant and custom programmer for several companies, including Tandy Corporation, Times Computer Corporation, IBM, Epson America, Inc., and Panasonic Computers

As founder of Micro-Systems Software, Inc., and the primary author of all our programs it is now my intent to create practical and quality software for you, by devoting my full efforts to the MSS Research and Development Division. Enjoy your Arrigo!



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Amiga Agony

If you have any technical problems concerning Amiga hardware or software, then write in to this page and our team of experts will straighten you out

Diskette Problem

Until recently, I have been using my Amiga with version 1.1 of both Kickstart and Workbench in American format. I purchased a copy of a new art program called *Artist Paint II* only to learn later and find that it would not work correctly with my version of Kickstart. Help! I have spoken to my dealer who says it is because the program is American, is this right?

David Smith, London

*No. The reason *Artist Paint II* will not work is because it was designed to use the second version 1.2 of Kickstart. As all software will in the future be designed to use this system it would be advisable for you to go to your dealer and TELL him to get your disk updated to the new version of both Kickstart and Workbench.*

Transformations

A friend of mine recently told me his Amiga, which he imported personally from America in early 1986. Although it works perfectly, I still have to use a transformer to run the machine on 240V. At first I have not found any software that will refuse to run on my machine, and find work. I was sent copies of 1.2 Workbench and Kickstart, which work perfectly. My questions are twofold.

Firstly, can I upgrade my main power to British PAL standards, so that I can then use a Greenback version? And secondly, what are the main differences between version 1.1 and 1.2 of Kickstart and Workbench?

P. Taylor, Camberley

Firstly, yes, you can upgrade your

machine, although it will be necessary to ask your local dealer to get the chips and software on first very rough and to fit them to you. Once the chips and power supply have been changed, you will have a completely compatible UK Amiga.

As for the differences between versions 1.1 and 1.2 they are basically clock and clock 1.2 Kickstart no longer is in the Amiga crash at the software programmer, and is essential for using on a PAL system. 1.2 also allows the Amiga to auto-configure itself for your RAM, allowing up to eight megabytes at once. For people used to 1.1 the most noticeable difference will be in the speed and features of the disk drives which are now a quite fast and much less noisy.

There are also differences in the Workbench software provided on the machine. The Preference is much more complete, with an extended list of comparable printers, and there are a range of other such additions.

Disk Size?

Unlike most of the people who purchase Amigas, I use mine as a business machine (although I do of course enjoy the other facilities it provides). When I bought the machine I was told that, when I wanted to, I could attach a 5.25" disk drive, and convert my IBM PC files to Amiga format.

Recently I've been working more from home and would like this facility, do I need software as well as the drive?

M. Stone, Birmingham

There are two completely different software in your position and should achieve a similar end allowing you various degrees of PC compatibility. The

*first was to solve your problem could be in the price of hardware produced by Commodore called the *Software*. This is a large box that plugs into the side of the Amiga, and comes with a built in 5.25" drive and a DOS program.*

*Basically the *Software* acts as a completely stand alone DOS machine that uses the Amiga as an input/output system. In 1985 DOS made the Amiga what the Amiga to run almost any IBM software although you do lose the obvious advantages of the Amiga's multi-tasking operating system.*

*The other alternative is to purchase a standard 5.25" disk drive, and some software called *Transformer*. This allows the Amiga's DOS program to emulate the DOS program and run a limited amount of PC software (including version 1.0 of Windows and Lotus 1.23), and to manage relatively easy Amiga format. It really depends how much compatibility you need. If you want to bring your own software, then the *Software* is for you. If all you want to do is bring over data to home and then port it over for example *Loggers*, then *Transformer* would do the job perfectly.*

Word Pro Problems

When I bought my Amiga, I also bought a word-processing package from Commodore called *Prograph*. As work I use it with an Epson Printer, and at home I use an FPC10 unfortunately, I have found a number of problems that spoil this otherwise excellent piece of software.

Firstly, and most importantly, when I fire and print my document, it is pages too printed by a random letter (typically a 'W'), this is both

waiting and time consuming as I then have to write out each letter. Secondly, if I run Trianglet from the wordlist drive, it sometimes hangs, without warning, meaning I have to reset my computer before I can continue.

Any help you can give would be appreciated.
D.Cole, Levens

Unfortunately the printing problem is a well-known bug in version 1 of Trianglet. To remove the random letter you must use the Gamma setting in your *Printer* file; unfortunately, this then means that you cannot see any special characters! The hangup is also a result of the early version of Trianglet's use of *array*, but it can be avoided by changing a line of the file, and being careful to make any files you do not need. As long as you keep this up, you will have no problem.

Thankfully Commodore has promised that there is a new and better version of Trianglet on the way, although we are at least able to convert your code into Scobble

which, as far as I know, has none of these types of problems.

Mathematical Speed

As a maths tutor, I have been very impressed at the capabilities of the Amiga as a workstation for jobs such as number crunching and the creation of fractal graphics and Mandelbrot.

My only quibble is that the 68000 processor is a little slow for these purposes, especially when the programs have been written in a language such as C.

Is there any way of speeding up the processor?

Professor B McGeeck, Hull

To be honest, any noticeable speed increase will cost a great deal of money, but if you have the funds, there are three different processors that would enhance the already existing 68000 or 68010 processor to replace the standard 68000 would enhance it to a speed difference ranging the machine between 50% and 100% faster. If your interest is with a machine that is 68010 or

greater to work as tandem with the standard 68000 it will probably achieve the most noticeable speed improvement.

Constant Kickstart

As with many other Amiga users that I know, I am becoming more and more used to having to boot my Amiga with Kickstart every time I wish to use it.

I understand that new Kickstart 1.2 is totally stable. Commodore has decided to install it as ROM in the newest machines (the A3000 and A3000). In this way, we have got Kickstart on ROM for my A3000?

P. Summers, Hackney

Don't worry, the answer to this question would have been no, but last week I found that computer in America has started doing just that. Even more exciting is that on the company page Kickstart 1.2 on 1704 ROM, the user has 1704 of extra Kickstart that can be used for purposes such as a RAM disk. At the time of press, there were no details of price or availability, but watch this space.

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Amiga On Line

Communications is fast becoming one of the most popular computer applications. Not to be left out, Felina software has come up with A-Talk for the Amiga

By Anne Owen

Already the Amiga has made its mark in the burgeoning world of microcomputer communications. One of the earliest software successes was at Microsoft: the on-line magazine on Periodic Staff at Microsoft are looking forward to taking delivery of their Amigas which they will use as internet editing workstations. T2 Computing are writing the software. *AutoKey*.

Bulletin boards are already embracing the Amiga and AUG (Amiga Users Group) has set up its own information board. Ceredah Computers are offering an Amiga/MS4080 combination and ownership of the bulletin board for as little as pence.

From the United States comes software packages like *Macroman-Dakar* and *Commodore's own Amigauser*. And a powerful new challenge for your Amiga money order is *A-Talk*. The publishers, Felina Software, develop outstanding programs about what *A-Talk* is your best bet for communications. *A-Talk* certainly has a wide range of abilities

whether your modem can internationally language.

Depending on your modem, dialling speed logging is can be made incredibly easy with *A-Talk*. Dialling can be automatic from a 'glorified telephone directory'. Up to 30 different registers can be stored alongside a log script—a disk based script containing your side of the dialogue which takes place with the host computer when you telephone. A log script can contain commands such as WAIT, DELAY, TIMEOUT and SAY.

One of the proud boasts of *A-Talk* is that it supports arbitrary ASCII file transfer, XMODEM error checking transfer and KERMIT error checking transfer. The first of these can be used to send messages and compressed data. The two latter protocols are the more popular and involving binary files and important text files. Data comes across over the telephone. The *A-Talk* XMODEM option automatically checks binary files (prevents the padding). All modes add the ease with prompts and status information on the screen.

A-Talk supports a number of common terminal types: ANSI TIA23, SP23 and U2 character profile. You can configure for working with UNIX systems. It supports VT100 escape sequences, VT32, HIR, ANSI and TTY, and can work with a restricted EBC VT100 editors.

Hang Up

A-Talk also has a voice option which can be used to store the text in a terminal's logging on screen transcripts

the morning's e-mail messages. There is also a 'bell' and sound 'blast' which can be used as an alarm to alert the user to a completed operation.

The *A-Talk* manual is very helpful and contains with examples of all the features on disk. These tend to be specifically American but given as well as what is needed for the UK equivalent. Certainly if you are regularly logging on to services in the USA, *A-Talk* could prove very useful. *A-Talk* is admirably programmable so it is possible to have the Amiga to carry out a simple login, send or retrieve logoff operations all by itself.

The manual also provides handy hints on what other computers will expect by way of methods and special characters and there's a map to help guide to linking in IBM and an Amiga for direct data transfer.

Some features of *A-Talk* are available to public domain and commercial software but members of those I have seen (*Macroman-Dakar* and *Amigauser*), have then been confident so powerfully. The adaptable manual and the offer of updates and support allow the to be highly motivated *A-Talk* to Amiga communications.

An *A-Talk* file is already in use with support for Tektronix 4014/4015 graphics simulation. Graphics produced on screen can be printed to any Workbench 1.3 supported printer or saved to HP file. The standard screen can also be changed to 300 by 440 pixels for additional resolution. Price 995 95.

Tom Shaw

Name: *A-Talk* Price: 949 95 Machine: Amiga, Supplies: Prime Software

Dialup

A-Talk's screen and user interface is built around the familiar pull-down menus which take care of operations under the headings: Project, File, Window, Format, Set and Exit. You can set up local use from 380 (some bulletin boards) to 9800 (computer to computer). There is control of parity, stop bits, seven or eight bit word, handwriting (Kern/NoK) protocol, full or half duplex. The dial menu for telephone modems and telephone type, and number of automatic retries and

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Abstract

These findings have a number of implications for the design of the training program. First, the results suggest that the training program should focus on the development of the trainees' self-efficacy and their ability to identify and solve problems. Second, the results suggest that the training program should focus on the development of the trainees' ability to work in teams and to communicate effectively. Third, the results suggest that the training program should focus on the development of the trainees' ability to manage their time and resources effectively. Finally, the results suggest that the training program should focus on the development of the trainees' ability to adapt to change and to learn from experience.

Amiga Basic: an Overview

Getting to grips with a new Basic can be a daunting prospect. Here we try and help you on your way.

By L.K. Gibson

The Basic supplied with the Amiga has been written by Microsoft and is a variant of the standard Basic found on many, right? (a) and (b) machines. The Basic covers all of the features of standard Microsoft Basic but has enhancements to make use of the Amiga's extra facilities. Unfortunately not all of these are accessible through Basic. One of the major disappointments in this area are the sound commands, more about this later.

Most users that buy an Amiga will be familiar with Basic, from a personal computer. Even though the dialect may be different, there will be many similarities, where there is only a need to learn the new syntax.

The second advantage is that Basic is supplied with the Amiga. It is therefore very accessible as an editor and should be made up with a clean, uncluttered, blockbuster you know that your prospective buyers will be able to run your program with no problems.

Another advantage is speed. Ideally, for programs to execute at speed, required for complex graphics etc. C is an excellent one in the above class. But remember, most users will be used to seeing Basic on sight for machines and believe me, Basic on the Amiga is a rather pleasant surprise, and if used properly can equal or beat right languages, running machine code!

Amiga Basic also has some fairly advanced functions. An example of this is the CALL command which allows you to call machine code routines written in assembler language

or C. This allows you to develop a routine just starting off with just Basic.

The CALL command also allows you to access some of the commands in the system Libraries - e.g. the graphics library - which are a definite requirement for any serious programming.

We all know by now that most dialects of Basic supports various standard Basic commands such as FOR, NEXT, PRINT etc. It is possible to spend any time time on these then simply to say that they exist within Amiga Basic. What I will discuss are the commands that are slightly more peculiar to Amiga Basic or not standard to some other dialects of Basic. Beginning with graphics.

AREAREG

This command is a very fast polygon drawing routine and incorporates a fill routine. It uses a call to the graphics library function AREAREG and can be used with a pattern fill also.

Circle

This command allows various parameters, detailing the circle, including its centre, position, radius, colour and aspect ratio. In version 1.1 of Workbench (introduced there is no Circle function in the graphics library. This is therefore implemented by Microsoft's own developers. Note that version 2.0 of Workbench (introduced) does have a circle function but within Amiga Basic is referred to a new version that will not be added from Basic.

Get and Put

This command allows for swap info from the screen to be picked up as an array and be redrawn using PUT in another area or on a different screen. It is very fast and can produce some interesting graphics if used properly. There are various graphics library functions that would perform this operation and I don't know which ones were employed but I would hazard a guess at BitBltMap which copies sections of screens being swapped from one location to another using the systems hardware BitBlt chip.

Line

This will draw lines or boxes which can be filled using the Move and Draw commands.

Objects

There are various Basic commands that can be used for the animation of graphics objects. These include OBJECT AX, OBJECT AY, OBJECT CLIP, OBJECT CLOSE, OBJECT HIT and OBJECT ON.

Paint

This command fills a area with colour up to an enclosed boundary. All you have to do is specify any x/y co-ordinates within the shape and the colour to be used. This command uses a call to the graphics library function Flood.

Pattern

This allows you to define the patterns for basic text and point operations.

PSct and Pcnt

I have grouped these commands together because they are complementary functions. PSCT allows you to set any point on the graphics screen and POINT allows you to read the current colour of any pixel on a graphics screen. The graphics library calls for these functions: WritePixel and ReadPixel respectively.

Screen and Window

These two commands produce a screen, according to various limitations which can be in any of the standard Amiga resolutions including Resolution 640x320 (Pixel vertical resolution). The user must then create a window in which to draw. The window can be any size within the screen limitations and be rendered with or without system window gadgets. Note that the standard Amiga user screen and window can be used (640x200 resolution) but the limitation is four colours (two planes deep) so far as serious graphics are concerned and windows have to be created using the above commands.

Scroll

This command allows a rectangle of almost any size to be scrolled in any direction. This command is limited by the fact that as the defined rectangle is moved it wipes out any background data it scrolls over and replaces it with the background colour.

That concludes the discussion on some of the more advanced graphics commands. I am happy that not all of the graphics commands are listed here. Now I'll take a brief look at sound and speech commands.

Sound

This command is the primary as used in Amiga Basic, allowing sample sounds to be produced on any of the Amiga four sound channels. Parameters that can be set using the SOUND command are: Frequency, Duration, Volume and Wave Channel Number. The default

waveform for the SOUND command is a 'bell wave', but this can be stored using the WAVE command.

Wave

When a sound is played on the Amiga the shape of the sound is taken from a waveform defined in memory. This waveform defines a sound envelope and controls the type of sound produced. The shape of the waveform can be changed using the WAVE command. This gives the effect of altering the type of sounds produced with the SOUND command. The waveform that you define is passed from an array, containing at least 256 numbers between -128 and 127, to the WAVE command. This new waveform is then used for the sound which you specify. Please note waveforms are put into the system memory so when they are no longer needed, the memory should be cleared using the GRAB command.

BEep

This command is probably the most limited of all the sound commands (which are in themselves limited). When this command is entered without a program that is a single audible beep and the screen flashes once. Note that there is a bug in the BEep command. See the later section on bugs for a discussion of this.

SAY

The SAY command takes a string of phonetic codes and speaks them according to a pre-defined level of fluency. The parameters are: Pronunciation, Speech Rate, Male or Female Voice, Toning, Volume, Channel, Mode and Control. Most of these parameters are self-explanatory apart from the last two. Mode allows you to set Synthesised or Acoustic speech. Control gives control over speech interruptions when Mode is set to Acoustic speech.

TRANSLATE

This is a very useful command since it will convert ordinary English text into Phonetic codes for use with the SAY command. This makes life easier, but you control over the speech is lost because the translator library,

although very good in some cases, makes mistakes. Also the Translator library will give your speech an American accent. Using SAY with Phonetic code will overcome this.

That concludes the Sound and Speech commands, and unlike the graphics commands, they are all listed above. As you can see, although speech is pretty well covered, Amiga Basic lacks in the sound department.

Data Files

Amiga Basic can handle two types of data file namely RANDOM and SEQUENTIAL. There are very easy to set up and use.

SEQUENTIAL

These files are easier to set than Random files but are also slightly more limited and slower. This is due to the fact that data is stored in ASCII characters. In order to access the Nth point of data, characters two to N must be read first.

Sequential files must first be opened with a mode specifier. This can be Read, Write or Append. You cannot open a sequential file Read and Write at the same time. The file must first be closed and reopened. If a Sequential file containing data is opened with a Write mode specifier, instead of an Append mode specifier, then all data in the file is lost.

An optional parameter that can be specified in the Open command, is the Buffer size. This tells the computer how many characters to Read or to Write out in one go. The default for this is 128 bytes but this can be decreased or maintained as desired. Increasing the buffer size speeds up I/O but makes heavier demands on memory, i.e., obviously, users must make a bigger compromise.

RANDOM

Random files are slightly more cumbersome to set up and use than Sequential files but the benefits offered may well make the extra work worthwhile. Amiga Basic Random files are very fast and are accessed via their records number.

The Amiga Basic manual's coverage of the commands are interchangeable between the two data formats, with only requiring different parameters.

EVENT TRAPPING

Event trapping is a means of creating the impression of two simultaneous operations. Certain events in Amiga Basic can be trapped and a specific routine can be jumped to for use during the event. The program line is then passed back to the stage proceeds to the event trap. The most common trap is `ON ERROR` whereby, if an error condition occurs within the program an error routine is executed and then the program is either terminated or redirected depending on the nature of the error.

Amiga Basic supports a wide range of Event trapping that most Amiga developers consider `TIMER`, `MENU`, `MOUSE`, `ERROR` and `COLLISION` because some of the techniques achieved with event trapping are not possible in standard Basic.

Event trapping is very easy to initiate and use. Firstly the user must build a routine that is going to handle an given event. This will take the form of a standard subroutine. An example is to document an on screen timer every second. The routine will purely document the screen display. There is no need for any event checks because this routine will be called only on the timer trap. Now as most Amiga Basic event trapping, this is accomplished by using a `TIMER ON` Command.

We now have to tell Amiga Basic where we want to go and on which point Basic will pass `ON TIMER` (1) `GOSUB` Routine. This will document our subroutines and Basic will document every second from now on or until event trapping is cancelled with `ON TIMER` (1) `GOSUB` 0. An `ON EVENT GOSUB` 0 traps event trapping for the `EVENT` specified.

MOUSE

This traps the user whenever a button is pressed and is activated by `MOTION` `ON ON MOUSE` (0) `GOSUB` Routine. This type of event trapping is useful for on screen menu selections.

MENU

Providing you have set up menus using Amiga Basic's `MENU` command this would trap the user pressing the right mouse button and selecting a menu

option. Pull down menus should be used whenever possible as this gives your program professional and user immediate.

Menu trapping is entered with `ON MENU` `ON MENU` `GOSUB` Routine name. Menu options are a subroutines mark straightforward. The Menu Number selected is held in `MENVAL` and the Menu item selected is found in the `MENITEM` variable. In the case of Menu trapping the Routine name is `ON MENU` `GOSUB` will be a subroutine to decipher which menu and item was selected and then executing another subroutine according to that selection.

BREAK

This allows trapping of the user trying to stop a program executed by pressing Right Amiga/Full Stop. The event is initiated with `BREAK` `ON ON BREAK` `GOSUB` Routine name. The Routine called Routine name could just contain a `RETURN` this would have the effect of disabling the Break sequence and nothing else.

COLLISION

This allows programmers to detect collisions on Objects between created using the `OBJECT SHAPE` command. Detection of collision can be user object or object to window. Event trapping on object collisions are executed with `COLLISION` `ON ON COLLISION` `GOSUB` Routine name. Routine name can be a subroutines to ascertain which object has collided using the `COLLISION` command.

FILE

FILE is an example program that can be typed in and used immediately and shows exactly how a list of the commands above work. Some of the programming style is hard to write. It was originally written for my own use but I have decided to put it in this article without too many changes.

FILE can be used for storing any type of record that will fit into a format. There are eight files each of which can contain an unlimited number of records. The record format is 99 characters (five field, 25 characters per data field and one character for the final field). FILE could be used for storing addresses and telephone numbers.

Operating Instructions

To make your own custom disk, you will require the File disk, a disk 0 (initial) and a blank (1) formatted disk in drive 1 (optional).

When FILE is first loaded there is a choice the disk in drive 1 is used if it is a valid data disk, there are two things which can occur at this point.

A. FILE will see that there is a data disk created earlier already containing some records. If this is the case you will be taken into the Workscreen.

B. FILE will see that the disk contains no records or files. In this case FILE will realise the disk is a new one previously formatted and will write the setup files in it.

Which ever option FILE chooses you will eventually arrive at the Workscreen. This is the screen where all of the record entry is performed. There are various events situated at the top of the Workscreen in the screen Title Bar. The options provided by these Menus will be outlined below.

Main Faces Menu

WRITE REC. This option is used for actually creating the records. The last record number filed will be displayed. The next record number at the top of the screen will be displayed and a new record to be created. The information for DATA 1 is entered first (max length 99 characters). Next DATA 2 (DATA 3) DATA 4 and DATA 5 are entered (max length 25 characters). Finally DATA 6 is entered (max length 25 characters). Finally you are asked if you wish to enter another.

READ REC. This option allows you to look at a particular record by entering its number. This is useful when a print-out has been made and record numbers are taken from the Error-1 to leave Read Record Mode.

CLEAR SCR. This option does a simple screen clear useful for some options that do not automatically clear themselves.

QUIT FILE. Always use this option to leave FILE. This is the only way to update the disk file which tells FILE the file status and how many records each file contains on re-entry. If you exit from FILE in any other way all work from the current screen will be lost.

Utilities Menu

LAST REC This option allows you to display the number of the last record stored under a particular file. Use this option to maintain the number of records under each file.

ALL RECS This option displays all of the records within the chosen file from a selected record number. The last record number is displayed and you are then prompted for a record number from which to start displaying. For example, if you have 200 records under a file and you enter 150 in the prompt, then records from 150 to 200 will be displayed on the monitor.

SEND REC This option allows for the correction of mistakes on a particular record. You must know the number of the record to be amended to use this option; this is useful when a program has been performed and checked. Any mistakes located can then be corrected using the Amend option.

DISK DIR This option gives a directory listing of the files on the disk disk.

PRINT ALL This option will print all the records from the selected file to printer. (Doesn't work if this option is used on a file which has a program associated with it or a cartridge file.) Print All is useful for going through all of the records on a particular file with the view of making any alterations necessary.

File Select Menu

There are six prompt areas under the menu; the contents are taken from the chosen input disk inserted. For example if when you inserted Disk you chose a Data Disk, created earlier with Files selected in drive 1 then the eight items under this menu would be the names of any files you created and **UNUSED** for any files not yet allocated.

If you select one of these files then all of the record listed options on the Utilities and Main Pages Menus will work upon this file. To work on another file select a new one from the File Select Menu.

Alternatively, if you have a new disk inserted the menu will all read **UNUSED**.

If one of these items is selected then Files will prompt you for a file name

which must be seven characters long.

Graphics and D005

One of the most exciting things that can be done in Amiga Basic is to call system functions contained within the Graphics and D005 libraries, although to do this you will need to be conversant with the Amiga Libraries.

The system routines are called using the **DECLARE FUNCTION LIBRARY** and **CALL** functions within Amiga Basic. The **LIBRARY** function calls a library from disk (if it is not already resident in memory) and opens it up ready for access via the **CALL** function. The **DECLARE FUNCTION** statement is used to tell Amiga Basic which system functions you are going to be accessing.

A lot of the system functions require fairly complex parameters but here I will concentrate on the simpler functions requiring only one argument.

Let's take as example the graphics library contains the functions **MOVE** and **DRAW**. These two functions allow you to specify a start point with **MOVE** and a draw to point with **DRAW**. Using this method of accessing the libraries makes very fast line drawing. Let's say we want a program that draws a line from a point 100,100 to a point 200,200. First we must open the system's graphics library and declare the two functions we are about to use with:

```
DECLARE FUNCTION Move()
LIBRARY
DECLARE FUNCTION Draw ()
LIBRARY
LIBRARY "graphics.library"
```

The next step is to move the cursor to the start point 100,100. We achieve this by calling the **MOVE** function:

```
CALL Move(100,100)
```

We add the **X** symbol to the end of Drive here as Drive is a variable. This has now moved our graphics cursor to point 100,100. We must now draw the line:

```
CALL Draw(200,200)
```

Visual is first appears on the screen. There will be some example programs here for those of you that wish to try out some actual code.

Another reason for using the system routines within your programs,

apart from speed, is to overcome some of the limitations of Amiga Basic. One such limitation is found in the way punctuation commands. Punctuation is not as powerful as a graphics action using the Amiga Basic function **LOCATE**. Unfortunately this function only works to character spacing and not post spacing.

But what if we want to place a line of the screen starting at a particular grid? We can achieve this using the **Graphics Library** function **MOVE**, just as we did above. Use **MOVE** to locate the cursor to the required post position and then just do a standard **PRINT**. Using this method of placing text on the screen gives no limitations to exact positioning.

A word of warning at this point before you can use any of the system libraries you must create what is called a **heap file** for each library you wish to access. This file is constructed using the program called **POLLOUSE** supplied along with Amiga Basic on the Extra disk.

The examples below will not work without the associated **Heap file**.

EXAMPLE 1

```
DEFINT H
DIM H$ (10000,10000)
DECLARE FUNCTION Execute()
LIBRARY "disk.library"
CONST H$00 = "Execute as command"
CONST H$01 = "C:\Program"
```

Examples

Most of Example 1 should be clear to you. **C:\PROGRAM** is where you will submit all the name of the path of code you wish to execute followed by any parameters required by the code. Also you need to click to the directory containing the **Heapfile** for the particular Library, in this case the **Heapfile** for the "disk.library" is in the directory **heap** (on drive 0).

This example allows you to run object code (program) written in C (68000) Modified via **Icon** within your own disk programs. This can be very useful on two counts. Firstly if you are already aware of some other language but are working in Basic and find that Basic is too slow all you need to do is write a short piece of code and then call that from Basic as shown above.

The second count is where you need to run a piece of special code

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Journal of Internal Medicine 255: 105–112

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

```

PRINT PRINT "Please enter 7
or more of the New 100-Word
or 7 Characters in Length.
Input a word: "
IF NOT LEN(word) THEN PRINT
"Please re-enter a word."
END

```

```

SUBJECT FROM: Begin
END
FROM FROM: 'BODY SUBJECT
IN USE' PLEASE SELECT NUMBER
- BEFORE MESSAGE.
FROM FROM: If There Are A
A MESSAGE. Choose In The FILE
A SELECT Now. Start A New Is
To End."
END

```

[illegible]

```

    @classmethod
    def from_dicts(cls, dicts):
        """
        Create a new instance from a list of dictionaries.
        """
        return cls(*dicts)

    def to_dicts(self):
        """
        Convert the instance to a list of dictionaries.
        """
        return [self.__dict__]

    def __str__(self):
        """
        Return a string representation of the instance.
        """
        return str(self.__dict__)

    def __repr__(self):
        """
        Return a string representation of the instance.
        """
        return repr(self.__dict__)

```

[illegible][illegible]

ANICA BASTIC

DOI: 10.1002/for



ONE ON ONE

Despite the swimming screens and small playing area of a one on one basketball match, One on One is a very addictive and easy-to-learn game. There are many subtle variations of skill level - make sure that you start "in the park" to give yourself a chance. Options are available between games from pull-down menus.

One of the features that is going to make Amiga games stand apart from the rest is the digital sound which can be incorporated into a game to give it added realism. In One on One, the crowd noise is just that - a recorded basketball crowd complete with yells of "Shoogie". The referee is on the line, "continuous charging" and the sound of the ball bouncing is very realistic. It is a taste of Hudson Commodore's success, but you are in there waiting for one of the players.

The graphics and music are a bit ordinary but the screen is in red and light green and you can keep going back to it at a bit of a loss. Mouse control is also supported so you can play with the new system.

Features

Author: Steve Gray **Price:** £29.99 **Machine:** Amiga **Supplier:** Commodore **68k Emu:** Amiga **ROM:** 256K **RAM:** 256K **Ref:** 01/24/24/24 **Originality:** 7/10 **Graphics:** 6/10 **Playability:** 8/10 **Value:** 7/10

SEVEN CITIES

The game, which is available on all computers, is a real "Clash of the Titans" game.



software it may be, with a lot of computer graphics, editors, the complex, complex, and more, etc. of skill and planning required to develop, but it looks interesting and doesn't really use the Amiga to its full. The opening screen of an unusual kind of writing, the title with a special, much better in the end, the high point.

Some, taken from the graphics are captured in the story of the European king, but you can see on your journey of discovery to the west. Despite a fairly normal feel of information, the lack of an in-game map (conveying some game, historical context would have contained more detail).

Amiga One provides your first map and game but also offers the option to create your own map data. So, if this is your first game, the Amiga is a challenge. A fairly easy exploring with Seven Cities and finding with original music is not an option I would personally consider and I think that some of the most interesting features will have more to offer in the way of a challenge.

Amiga is needed because both keyboard and mouse control is very awkward. Unless you are fully familiar with strategy type games, then this one will be given a pass.

Features

Author: Steve Gray **Price:** £29.99 **Machine:** Amiga **Supplier:** Commodore **68k Emu:** Amiga **ROM:** 256K **RAM:** 256K **Ref:** 01/24/24/24 **Originality:** 8/10 **Graphics:** 7/10 **Playability:** 7/10 **Value:** 7/10



MEAN GAME OF GOLF

What is it about the Amiga and golf? Do these strange words make sense, or is it just the fact that the sophisticated Amiga was less so, or of the mean only to take up the challenge? Maybe you're right, since I was happy to take up the challenge and down by Amiga's Mean 18 golf game and to down competition with Keyboard.

From a playing point of view, Mean 18 is a great game with accurate and difficult to master representations of golfing courses, such as St. Andrews, Augusta National and Pebble Beach. There is much less tolerance on ball play in Mean 18 than in Keyboard and the Mean 18 player feature is a necessary punishment, plus to get a feel for the controls and to find your own balance of power and accuracy.

Mean 18 doesn't take you into the game as smoothly as Keyboard, but you need to click the mouse button to

effect to prompt the next stage. Televisions can squeak like tape and demonstrate effects though they are slow down the pace of the game.

The multiple options on players - up to four types of scoring - strike, punch and foot ball - are - professional or regular skill - experienced or beginner - make for variation. Beginners get advice when club choice is not as perfect as an. Club options are professional green or a hole in your shirt! legs round and quit. You can win a game in progress for later revival.

I am not too fond of the graphics which make up the score, although striking convenient shafts for heavy. Light rough shots though etc. helps the player. The main let-down is the play on the green with an overhead view of the putting surface. It doesn't give a feeling of motion, movement and, and reminds me too much of a robotic simulation.

A major plus for the potential GOLF golf course designer is the Amiga supplied with Moon II. The example built into Amiga. Bush Hill shows what it can do. So if you want to simulate a round in your local links. Amiga is the answer. It's quite a complicated matter as you may have to extract your immediate ambitions to your hardware. You can paint and fill, set down lines, make more modified and better, modify the, change the shape and position on the green, place the tree and set up the hole.

There's plenty of attention to detail in Moon II with club choice, and terrain rendering for the highest results. Although Leadboard has a plot to the class, not yet as much a new set of realistic courses Moon II's Amiga course seems unique. I think Leadboard is the better design but Moon II has more features for the money and provides a tougher challenge, at professional level.

Touchline

Name: Moon II **Price:** £19.95 **Machine:** Amiga **Supplier:** Precision Software, 4 Park Terrace, Hemel Hempstead, Herts. AL9 7SE. Tel: 07 430 7355.
Developer: S/W **Graphics:** V/D **Playability:** S/D **Value:** S/D



TOUCH OF TRIVIA

Trivia Trivia from Engage is software for those who enjoy showing off their general knowledge. It was always the ubiquitous TV quiz show like *Who's the Boss?* while having

back in your kitchen then Trivia Trivia will test you further. It will also enable you to design your own questions in a word of Trivia Construction Set. This form is generator manages a file of up to 500 questions, listing them and their points then use for checking and finally saving to disc for access at the game.

All questions data is saved on the Amiga's external disc drive and Trivia Trivia relies on a two disc system to work.

The game consists of different levels and unlike most of the arcade machine image games and nothing like Trivial Pursuit. The displays are attractively done but there could perhaps have been more for some visual effects.

Each level of Trivia Trivia can be completed by answering the appropriate number of questions correctly. The questions are chosen by the player by, typically, clicking on a mouse button as the desired subject areas highlighted. Some of these choices are crucial to the game, as in Level 2 where the suggestions of the software regarding the correct introduction are an absolute random effect. You have a time limit to select the correct answer to the question.

Packaging and documentation is minimal and "home-made". In general, it's a game I enjoyed. If you have a need for the questions and correct database then you are getting real value for money.

Touchline

Name: Trivia Trivia **Price:** £1 **Machine:** Amiga **Supplier:** Circumlocution Computers
Developer: V/D **Graphics:** S/D **Playability:** S/D **Value:** S/D

Archie

Without doubt, this is a tremendous game and an original one. Despite the limited chessboard layout, it makes good use of the Amiga's qualities with smooth graphics and atmospheric sound. The opening sequence is like that of a short film or cartoon with design and programming credit. The first sequence is famous with a quick reference card for the various "pieces" of chess. The main board's steady light on the completion of human moves, using spells and chessboard squares and it does so with a lot of flourish.

Fortunately I didn't play my moves with my computer since it is a two player game. No humans in tonight? Then play the computer. Depending on the current abilities, it is considered to be a goodly declared by the computer, a handicapping system ensures a close game.

Watch out though. You can only play Archie with a mouse, and you'll need two for the two player mode since direct control is required. Whenever some clash on a square of the "strategic" level combat is joined. The two sides deal with the weapons that is their specialty, with the tactics appropriate to their style of fighting and for as long as their related tactics will allow.

Even in victory, the game can become weakened. Depending on many factors, they may, recover, something is certain with every piece to another battle zone. The worst target of the light side and the worst of the dark side, and not figures in the game, their spell-casting can take the risk, or their to cast through use of magic to REVEAL, HEAL, EXCHANGE, IMPROVE and TELEPORT IMPROVE and SPIRIT THE COURSE OF TIME can be used with various to powerful effect on a few real time.

Each type of move has its own strategy and tactics, so



of characterisation and there isn't a lot of room for them doing much. The knights and pawns are the grunts of the two sides, light and dark. By getting close and working with the equipment they can come up with surprising results. There are lighter characters, assisted each by more subtle items and magical abilities and Mages and Wizards. The battles are deadly when skillfully flown, whereas The Phoenix seems to flounder in damage but the power is there to be harnessed.

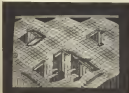
The dual personality of Archon - light and dark, tactics and warfare, the speed of battle but the calculation strategy demanded for victory - makes it an absorbing game. The two player version comprises a well designed and enjoyable environment.

Trendline

Name: *Archon* Price: £29.95 Minside Amiga Supplies
trading's Mail Shop Ltd, London EC7 9WV Tel: 071 83 5117
Distributors: W/O Graphics W/O Playability W/O Future
W/O

MARBLE MADNESS

When the Amiga became public property the game Marble Madness was instantly associated with it because the graphics served as an early demo of what the computer could do. Now the classic arcade hit is available for all to play. Not only just decent graphics (if becoming more and more so), it was also a thought in the time spent down with your god in controlling your version.



The game itself is recognised by Workbench - the Amiga's own graphics/mouse demonstration - and you double click the disc, open and then the marble starts to loose the game into action. The opening screen is welcome. The author, Larry Reed, for whom I have the greatest admiration, saved the best for the game.

Screen one the program runs as intended fairly quickly. The lead-in is red and yellow with black gridlines. The three dimensional graphics are excellent, the accompanying two, sharp, periodic, urging music, into the groove setting moodily towards the CDROM, area at the end of the path. The pattern is set for the other more complicated sections to come. You should be getting plenty of bonus points for this, but after and a few more.

Instant two and more money, a blue, landscape, a do, phone, however, as you recollect, pinball like, from the 1D blocks. There is an aggressive black marble which you can force off the edge of the playing surface for 1000 points, green/yellow dots, instant situations which send your marble into a spin and try their best to keep on top of it - a trick's and. You have to negotiate traps and bridges, open down metallic pipes and be ready to control your marble on a straight angle, sideways at the bottom of the slide. A green shaded surface, glowing like, or empty, wrapping pool in the way, puts the slide under your marble for a final sprint to the CDROM area. Pinball.

It's more. The designed that, control, control is to be, refer to, means control. The original game used marbleball and a trackball option is available for the Amiga game. It hasn't been able to try it so much, as most best. Two types of trackball, one each, and more are supported, one one and two player mode. The original, however, is designed to front or back past. The discovery, offered, at least, is completed game. You can also increase the difficulty level (two times per screen) at this point (range 0 to 7). The two player version means two marbles, controlling for the same speed and an extra bonus for very aggressive play.

Each screen is a new trial. You can lose control of your marble and it may drop beyond the 1D playing area and onto the edge with it being ending instant/white. An unwanted hands may come in and sweep away the broken piece! The marble will always be spun back into position but there is taking away. The marble may be moved and give out a ball and spin in place. You start to get automatically attached to your marble! The latter one complete the early screens, the more chosen you have of success later on so you have to balance bonus points against the time taken to get them.

On to screen three. Dropping in a smallish red/marble from a slide, the marble has to negotiate a series, cut in the valleys. Vinyl records can be used in this section and more. The screen is dark, the valleys and more, interlocking. The bumps open, as you are ready, the green slide that disallows you marble, mostly in a central. By being down a red marble slide it brings more points. The path gets even thinner and a sharp, using, corner (bends the screen, CDROM).

Screen four, red and gold graphics and the aerial take. Bonus. The marble drops from a high platform (like an elevated golf tee) down a slide and out into space. As you hit the platform below, you start to employ marble, there on the course to this, around. Hitting the on track or more, bonus gives the marble a temporary, boost in speed. This can now be used to jump gaps in the path. It is also needed to rush past the vacuum cleaner-like hands which pop up and, referring, look at your marble, throwing a roll control, and if a pin ball

in the national A-starring, it's complete.

The marble, also hard to tell, manages to be on one platform or another. On landing, a middle-aged black marble gets after you. You're lucky to stay above ground at the point. Metal rods run poles up from the path, stirring you over the edge. As well as negotiating, the corner you find there malicious rubber flippers popping up out of tiny doors to defudge you, working in concert to bring a frustrating end to a brilliant run to GOAL.

Screen life - the main screen - and, as it were on screen, everything you know is wrong! From rain, it's up to! raindrops then rump and bang scuffed up paper. A now and then, a horse past further complements the previous journey of your marble. Great fun.

Get through this one and it's on to the ultimate level. One in space, with an eye visible, to make changing direction a painful, difficult. Progress is further delayed by bridges that form to take you over.

The music is both accompaniment each level plays a great part in leading the player into the game. Reggae-style electronic sounds, combined with electronic game chords and the sound effects unique to computer games. These accompany the marble as it flies down the road and into rough

or any terrain. The music, which another purpose, working up when the next level arrives (the disk drive is increased before each new screen and takes some seconds). The completion of each level is greeted with a variety of features in the style of the main music.

The graphics are very effective. The three-dimensional system is made even more convincing by the fast light and shadow. Each screen is full of detail. When a bridge is raised you can see the mechanism, the marble and some of the structures have an almost organic appearance; the three glass floorboard grass and a flat surface over the equivalent of a Mexican road!

Playing Marble Madness gives you the same feeling as making a tight rope. Its string on the edge of failure but with triumph in view. Even an extremely inflated Amiga gives the game is an essential purchase. It was Alan van der Aarde, Clontar, Arts have produced it for the Amiga and you can get it from Asiatel in the UK.

Position:

Name: Marble Madness, Price £19.95, Publisher: Amiga
Supplier: Asiatel, 40 Long St, London EC1M 3AW Tel: 81 116 1411

Graphics: 320 Graphics 320 Resolution, 60/15 Video
ARTE

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Page setter

Desk top publishing is taking off in a big way. The Gold Disk company is determined that the Amiga won't be left behind in the rat race

By Georges Duval

In previous computer times, the best word on the market in Desk Top Publishing or DTP to jargon lovers. From the moment that Apple released the Macintosh based DTP package using a laser printer capable of producing text at near typesetter quality, the market exploded, and soon there were hundreds of products ranging from the most rudimentary point and click to some incredibly complex packages capable of producing a complete magazine.

When the Amiga was officially released in the UK, there were already companies developing DTP software, but as we often happen, nothing was out produced except a few good ideas. One company that did bother to explore the possibilities of this colour Microcomputer is The Gold Disk company, and their product PageSetter has recently become available.

First Impressions

Immediately upon opening the

manual, I was impressed in the programme for what, so many software packages it has no pretensions. Indeed, although the latest user manuals belong to large personal ones, they spend too many hours trying to salvage lost programs and data, so to be fond of programs that come with adequately thought protection.

Unlike almost all the other currently available desktop publishing software, written for the Amiga, this one need to include complicated printer routines as there are all handled by Professional like version (not program). This means that Programs such as PageSetter can work on a variety of printers, although might ask on one group of laser printers, the Hewlett Packard Laserjet range. With an, however excellent results can be achieved on a variety of printers including most of the popular Epson compatibles.

As with all good software for micro based systems, PageSetter makes the most of the way to use a system and unlike almost all the other

DTP packages I have seen within 10 minutes it is possible to have the main structure of a page planned out.

Starting Out

To start a page, PageSetter works on a series of 'boxes'. Each box created at the start can be any size and can contain either graphics or text. There are two ways of creating boxes. Either you can pick the box open and create box on the screen, or you can import picture or some text from outside PageSetter and use the AutoBox function to create a box of the right size.

Boxes can be as big or small as the user wants, and in order that a large paragraph of text can be included, boxes can also be linked. When setting up the page, it is always necessary to come to certain decisions and PageSetter has the familiar Magnifying glass icon. This can zoom right in on any area of the page, not at all, so that the page is at WYSIWYG (What You See Is

What You Get! format. Once you have created a box, you can make the most of some of the available items. In this mode it is possible to change the colour for the box background, the style of border, the font for the box, the justification, and so on.

Graphics

In addition to complex text layout, *PageSetter* allows the user to add graphics anywhere on the page. Although *PageSetter* comes with a variety of basic pictures, it is the ability to import GIFF (International File Format) graphics from packages such as *Define Point* and *ChartDraw* that allows the user to create some truly striking layouts. To make the most of the graphics ability in *PageSetter* it is necessary to use the *Picture Control of Colors*. First to render the pictures black and white, but *PageSetter* was designed before *Picture Show* decided that colour was a necessity.

At last, any complex program *PageSetter* takes some getting used to, and many such pages will be no more than an additional collection of pictures. A few hours playing, however, is one of the best ways to learn the many control programs such as *Box* and *Line* (see the manual both comprehensively and for a convenient, practical summary—highly understandable!).

In order to cope with semi-professional publishers, *PageSetter* has the ability to create a document of up to 99 pages long. However, as the main program is 144k, and each page (without complex graphics) takes up between 7k and 8k, most non-published Amiga will be able to produce a document up to about 60 pages in length.

Editors

Although *PageSetter* is intended primarily as a page design and layout program, it does contain powerful graphical and text editors that, because they were designed specifically for the package, are often better suited for producing graphics and text than other external programs. The graphics editor has several features that make it unique, and perfect for GIFF.

First and foremost is its black and white. This is because practically it will be printed, and very few people have

TABLE 1

Typeface	Start available (point)			
Baskerville	8	12	15	
Baskerville	18	14	14	19
Opal	9	11	12	
Garnet	9	14		
Examiner	12	28		
Emerald	15	28		
Topaz	18	plus 9 to ROM!		

colour printers. To make the most of the graphics editor, there are a variety of shades that can be used, and you import a colour picture from another package. The shading will almost certainly be very unpredictable.

Another main difference is that *PageSetter* uses a graphics resolution of 640x768 whereas most graphics packages use 1024x1024. This is as inevitable as close as possible a comparison between the screen and the printer on which the hard copy will be produced. The graphic editor has a variety of functions that will allow users to do as they wish, but to create something that appears to be a picture, although the quality of the picture is as always difficult compared to the amount of time you spend producing it. Once you have created a manuscript it will be advisable to know it in order that no error can be manipulated and eventually so that it will fit in the hole you have made for it!

Although the graphic editor is important, the part of the program that most users will spend more time with is the text editor. As with its graphics sibling, the text editor is different in many ways to external word processors. Because of the power of *PageSetter*'s own formatting commands it is more difficult to use, which many find hard to be removed by hand. Thankfully, the program can reasonably import text from other *Textual* or *Write* without any problem.

Manual On

Most users of *PageSetter* will be aware

of its expected, complete coverage of the world of publishing and, to that end, the manual updates a good deal of its time telling the user how to set out pages and how to grab the readers' attention. Thankfully this is done in a manner of few minutes and impressively manages to avoid being too patronising. Chapters deal with setting up new letters, creating advertisements, and laying out a page with a photograph.

Summing Up

As you would expect on a program such as this, the time available on only those that the Amiga provides (table 1) and there is no hurry for the user to define or import any new ones. When compared to the likes of *PageMaker* or the Apple *Macintosh*, *PageSetter* seems to be very basic, but then it never claimed to be a professional publishing system. However, for anyone who wants to produce newsletters that look impressive, or basic advertisements with pretty black and white pictures, *PageSetter* could be just the ticket. It is not so user-friendly with an excellent manual and the assistance of the fundamental necessary for successful GIFF.

Considering the poor quality of a great deal of the software available for the Amiga including some of Commodore's own it is refreshing to find a company that cares enough to put the much work into a product.

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Everyman's Guide to Graphics

Graphics are a fascinating application for the C64. In this comprehensive guide, we point the way to better understanding and use of this facility.

By Allen Webb

In my view, the crucial part of any piece of software is the graphics. There are very few items which need no attention to graphics, with even a text only package being improved by a redesigned font.

In this article, I want to give a detailed run down of the C64's graphics capability and how you can use it. Where it simplifies life, I will give listings of all of helpful routines.

Vic Chip

First, let us consider the drawing logic behind graphics, the VIC-II chip. This chip contains the graphics system which can in turn be altered via a number of registers. These registers are memory mapped allowing you to change them easily. Table 1 lists the most useful registers.

That's a pretty messy lump of information and it's only provided as reference material. The rest of the guide will show you how the major important registers are used.

If you want to use your 64 efficiently, an appreciation of how it handles its memory is necessary. Figure 1 gives a sample memory map.

Table 1

Register	Function
52000-52009 (\$2000-\$2009)	Sprite positions
52011 (\$200B)	
0	Sprite Compare
1	Extended colour mode
2	Bit map mode
3	Blank screen
4	Hi/Lo row test
5	second word Y direction
6	Sprite Row/Frame
7	Sprite Pin register
8	Multiscroll mode
9	Hi/Lo colour test
10	Smooth scroll & dithering
11	Y expand register
12	Memory Control Register
13	stream control
14	Character table
15	Interrupt register
16	SDRAM register
17	Sprite position register
18	Sprite colour mode register
19	X expand register
20	Sprite to sprite collision register
21	Sprite to background collision register
22	Sprite colour register
23	Background colour register
24	Sprite extraneous register
25	Sprite colour register

The memory map can be considered to consist of two levels. The bottom level is a block of 64K of RAM. On top of this are superimposed two areas of ROM and other chips. Since different devices occupy the same address range, a register or address bus is used to decide which are switched on in the current use, the RAM under the ROMs is operable no matter that it can be used for programs.

The 64 square the block of R&A is four blocks of 16.

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Bank 0 is the default bank. The bank on use is specified in bits 0 and 1 of the **IOBANK** register.

The VNC can only address one bank at a time and is expected to find some use as server memory and a client is not washing the bank. This approach offers almost unlimited flexibility but also makes the use of graphics in the desktop bank impractical.

Since the CPU and the VIC chips operate independently, the CPU doesn't even blink an eye. So graphics. We can therefore reconfigure the machine from BASIC very easily.

Let us consider how to reconfigure the network, again.

Classifying the FASs

This is achieved easily by changing the number of `NTSC`:

10 POKE 56576, (PORG56576) ON
20 POKE 56576, (PORG56576) AND
300 (PORG56576)

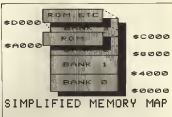
Lucas 18 prepares the ground and lists 30 examples in Luke 18, number 18.

The VIC chip ignores the absolute address of the bank and uses only the relative addresses within the bank, i.e. each bank ranges from \$0000 to \$0FFF.

Warm-up the Character Set

The register at 5377H tells the VIC chip where to get its character data. In fact bits one to three hold the information. This information is displayed by

FOI# 55273, (PENDING) 55273,
ADDITIONAL INFO



X is equal to the start address of the character data divided by 1624. With only three bits used, only eight character sets are possible: e.g. $x = 0, 2, 4, 6, 8, 10, 12, 14$.

Since the machine presents up to 8 characters at a time, there must be default missing characters. In fact, the default character set is held in ROM. This data is mapped to banks 0 and 3 and is found at the following addresses:

81000-81311 (Lower case set 26-4)
81000-81312 (Lower case set 26-5)

Clearly, it is possible to have a number of different sets of characters in a bank and simply match between them, as needed.

Winning the Season

The *uacron* comprises of 1600 bytes of contiguous memory which usually resides between locations 0024 and 303A. This pointer is specified in bytes 4 to 7 in location 35372. These bytes actually specify the position of the *uacron* as new bank of memory, and can be changed by:

FOIA b(7), (D) b(7)(C) AND (D)
b(7)

Y is equal to the sum of address of the screen divided by 80. This term we have four bits in the register allowing 16 possible screen positions with Y ranging from 0 to 240 in increments of 16. Unfortunately, you cannot use a

RAM areas for the screen. If you use the areas mapped by the character `ESC`, you will get garbage on the screen.

In addition to changing the VIC register, you must also tell the operating system where the screen is. This is done with

DOI: 10.1002/for

where SCREEN is the start address of the screen area.

The seven subject matrices cannot be moved and, in fact, presents no difficulties.

Listing 1 shows you to re-eval-pgm page 64. The first pass asks you to specify where the income and the tax are to be put. These values are checked to ensure that they are in the same bank and are not at the same address. I don't check any further subwords. Line 65 to 68 calculate the expense values. Line 69 checks to see if you need to empty down the character set and loan 80 to 130 the job of required. Lines 69 to 790 re-eval-pgm the expense.

References

[illegible]

```

58 80 30-ANTI-ALIASING/THROTTLE
59 80 70-SCREEN SPREADING/PAUSE
60 80 10-SCREEN SPREADING/PAUSE
61 80 10-SCREEN SPREADING/PAUSE
62 80 10-SCREEN SPREADING/PAUSE
63 80 10-SCREEN SPREADING/PAUSE
64 80 10-SCREEN SPREADING/PAUSE
65 80 10-SCREEN SPREADING/PAUSE
66 80 10-SCREEN SPREADING/PAUSE
67 80 10-SCREEN SPREADING/PAUSE
68 80 10-SCREEN SPREADING/PAUSE
69 80 10-SCREEN SPREADING/PAUSE
70 80 10-SCREEN SPREADING/PAUSE
71 80 10-SCREEN SPREADING/PAUSE
72 80 10-SCREEN SPREADING/PAUSE
73 80 10-SCREEN SPREADING/PAUSE
74 80 10-SCREEN SPREADING/PAUSE
75 80 10-SCREEN SPREADING/PAUSE
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77 80 10-SCREEN SPREADING/PAUSE
78 80 10-SCREEN SPREADING/PAUSE
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81 80 10-SCREEN SPREADING/PAUSE
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93 80 10-SCREEN SPREADING/PAUSE
94 80 10-SCREEN SPREADING/PAUSE
95 80 10-SCREEN SPREADING/PAUSE
96 80 10-SCREEN SPREADING/PAUSE
97 80 10-SCREEN SPREADING/PAUSE
98 80 10-SCREEN SPREADING/PAUSE
99 80 10-SCREEN SPREADING/PAUSE

```

In any case, the crated part of any page

Run Listing 1 putting the screen at 50176 and the character table at 51000 and then enter the line

POKE 44, POKE 1024, 0 NEW

You will have a machine offering 2048 bytes for Basic and 344 spaces. That's a lot more than you get on switch on! The extra capacity is achieved by:

1) Using BANK 3 and moving the screen and character set to a handy block of RAM between the ROMs.

2) Moving the start of Basic program stage down to 1024. Since we've moved the screen we can use the normal screen area for Basic.

3) You can use the memory between the Screen ROM (51000 to 51999) and the remaining memory between the ROMs (60700 to 61999) for spaces.

Machine code users don't have such a tough time since they aren't constrained by where they have to put their programs. It is, nevertheless, useful to reconfigure the machine Graphics Modes.

Before we launch forth into graphics handling, we must consider the graphics modes available to us. The screen occupies 1600 bytes and is divided into 6400 addressable pixels or pixels. There are two graphics modes allowing manipulation of the screen:

1. Character Mode

In this default mode, the screen area

1600 characters, each occupying an 8x8 pixel cell.

2. Bit mapped mode

In this mode, the screen uses a 320 by 200 array of pixels. Using this mode it is possible to create patterns and other images.

The fundamental difference between these modes is that character mode is supported by the operating system, whereas bit mapped mode has no software to drive it. Both modes use 819 calls to control the colours used.

In addition to the graphics modes, there are three colour modes.

1. High resolution mode

This is the default graphics mode. In this mode, any given cell may contain only two colours, the background or paper colour and the foreground or ink colour. Any set pixel will have the ink colour and any unset pixel will have the paper colour.

In character mode, the paper colour is held in VHC register 53281 and the ink colour is held in the colour register.

This mode allows the greatest detail, albeit at the most limited colour range.

2. Multi-colour mode

In this mode, pairs of pixels are used to define sets of colour. Since there are four possible arrangements for two pixels, four colours are allowed in any given character cell (Table 2).

Pixel one	Pixel two	Colour Register
clear	clear	53281
clear	set	53282
set	clear	53283
set	set	colour register

This mode is a lot better but offers greater colour flexibility.

Extended Background

This mode uses high resolution but offers four different paper colours in addition to the usual ink colours. The paper colour is determined by the POKE value of the character used and

limits you to 64 different characters (Table 3).

Modified characters

OK, we've done the setup work, let's now look at the use of user defined characters.

You will have realised that the shape of characters is held in a table of data. Figure 1 shows how a character is represented. The device compares eight bits of data to figure out that each set pixel is a 1 and each clear pixel is 0. That being so, the top line becomes 00111000. The decimal equivalent of this binary number is 60. Similarly, each line can be converted to a data value. The character table compares a sequence of data values for each character. The first eight data values in the table is used by the character normally used by IF. The second block of eight is used by the character A. And so on. For any given character CH, its data values start at

TABLE ADDRESS + CH*8

As an experiment, run Listing 1 as

```

Listing 2
10 DATA 60, 34, 34, 60, 34, 34, 60, 34
20 DIM A FOR I=0 TO 255 READ X
30 POKE 51000+I*CH*8, X
40 NEXT I

```

before putting the character table at 51000. This runs as and runs Listing 2.

Now what happens to the later D? Using this approach is rather slow, Listing 3 gives a machine code alternative.

This code lives at 55000 allowing you to set a reference screen and character set in earlier. This code has

POKE CODE	COLOR REGISTER
64-127	53281
128-191	53282
192-255	53283
	53284

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Brother	PR113/114	£ 14.99	£ 24.99	£ 34.99
Brother	PR115/116	£ 14.99	£ 24.99	£ 34.99
Brother	PR117/118	£ 14.99	£ 24.99	£ 34.99
Brother	PR119/120	£ 14.99	£ 24.99	£ 34.99
Brother	PR121/122	£ 14.99	£ 24.99	£ 34.99
Brother	PR123/124	£ 14.99	£ 24.99	£ 34.99
Brother	PR125/126	£ 14.99	£ 24.99	£ 34.99
Brother	PR127/128	£ 14.99	£ 24.99	£ 34.99
Brother	PR129/130	£ 14.99	£ 24.99	£ 34.99
Brother	PR131/132	£ 14.99	£ 24.99	£ 34.99
Brother	PR133/134	£ 14.99	£ 24.99	£ 34.99
Brother	PR135/136	£ 14.99	£ 24.99	£ 34.99
Brother	PR137/138	£ 14.99	£ 24.99	£ 34.99
Brother	PR139/140	£ 14.99	£ 24.99	£ 34.99
Brother	PR141/142	£ 14.99	£ 24.99	£ 34.99
Brother	PR143/144	£ 14.99	£ 24.99	£ 34.99
Brother	PR145/146	£ 14.99	£ 24.99	£ 34.99
Brother	PR147/148	£ 14.99	£ 24.99	£ 34.99
Brother	PR149/150	£ 14.99	£ 24.99	£ 34.99
Brother	PR151/152	£ 14.99	£ 24.99	£ 34.99
Brother	PR153/154	£ 14.99	£ 24.99	£ 34.99
Brother	PR155/156	£ 14.99	£ 24.99	£ 34.99
Brother	PR157/158	£ 14.99	£ 24.99	£ 34.99
Brother	PR159/160	£ 14.99	£ 24.99	£ 34.99
Brother	PR161/162	£ 14.99	£ 24.99	£ 34.99
Brother	PR163/164	£ 14.99	£ 24.99	£ 34.99
Brother	PR165/166	£ 14.99	£ 24.99	£ 34.99
Brother	PR167/168	£ 14.99	£ 24.99	£ 34.99
Brother	PR169/170	£ 14.99	£ 24.99	£ 34.99
Brother	PR171/172	£ 14.99	£ 24.99	£ 34.99
Brother	PR173/174	£ 14.99	£ 24.99	£ 34.99
Brother	PR175/176	£ 14.99	£ 24.99	£ 34.99
Brother	PR177/178	£ 14.99	£ 24.99	£ 34.99
Brother	PR179/180	£ 14.99	£ 24.99	£ 34.99
Brother	PR181/182	£ 14.99	£ 24.99	£ 34.99
Brother	PR183/184	£ 14.99	£ 24.99	£ 34.99
Brother	PR185/186	£ 14.99	£ 24.99	£ 34.99
Brother	PR187/188	£ 14.99	£ 24.99	£ 34.99
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a slow and easy complex. Listing 4 gives a machine code package for handling the mapped mode.

```

LISTING 4
00 1000 POKE=POKE 65,0:POKE=PO
01 1010 POKE=POKE 66,0:POKE=PO
02 1020 POKE=POKE 67,0:POKE=PO
03 1030 POKE=POKE 68,0:POKE=PO
04 1040 POKE=POKE 69,0:POKE=PO
05 1050 POKE=POKE 70,0:POKE=PO
06 1060 POKE=POKE 71,0:POKE=PO
07 1070 POKE=POKE 72,0:POKE=PO
08 1080 POKE=POKE 73,0:POKE=PO
09 1090 POKE=POKE 74,0:POKE=PO
10 1100 POKE=POKE 75,0:POKE=PO
11 1110 POKE=POKE 76,0:POKE=PO
12 1120 POKE=POKE 77,0:POKE=PO
13 1130 POKE=POKE 78,0:POKE=PO
14 1140 POKE=POKE 79,0:POKE=PO
15 1150 POKE=POKE 80,0:POKE=PO
16 1160 POKE=POKE 81,0:POKE=PO
17 1170 POKE=POKE 82,0:POKE=PO
18 1180 POKE=POKE 83,0:POKE=PO
19 1190 POKE=POKE 84,0:POKE=PO
20 1200 POKE=POKE 85,0:POKE=PO
21 1210 POKE=POKE 86,0:POKE=PO
22 1220 POKE=POKE 87,0:POKE=PO
23 1230 POKE=POKE 88,0:POKE=PO
24 1240 POKE=POKE 89,0:POKE=PO
25 1250 POKE=POKE 90,0:POKE=PO
26 1260 POKE=POKE 91,0:POKE=PO
27 1270 POKE=POKE 92,0:POKE=PO
28 1280 POKE=POKE 93,0:POKE=PO
29 1290 POKE=POKE 94,0:POKE=PO
30 1300 POKE=POKE 95,0:POKE=PO
31 1310 POKE=POKE 96,0:POKE=PO
32 1320 POKE=POKE 97,0:POKE=PO
33 1330 POKE=POKE 98,0:POKE=PO
34 1340 POKE=POKE 99,0:POKE=PO
35 1350 POKE=POKE 100,0:POKE=PO
36 1360 POKE=POKE 101,0:POKE=PO
37 1370 POKE=POKE 102,0:POKE=PO
38 1380 POKE=POKE 103,0:POKE=PO
39 1390 POKE=POKE 104,0:POKE=PO
40 1400 POKE=POKE 105,0:POKE=PO
41 1410 POKE=POKE 106,0:POKE=PO
42 1420 POKE=POKE 107,0:POKE=PO
43 1430 POKE=POKE 108,0:POKE=PO
44 1440 POKE=POKE 109,0:POKE=PO
45 1450 POKE=POKE 110,0:POKE=PO
46 1460 POKE=POKE 111,0:POKE=PO
47 1470 POKE=POKE 112,0:POKE=PO
48 1480 POKE=POKE 113,0:POKE=PO
49 1490 POKE=POKE 114,0:POKE=PO
50 1500 POKE=POKE 115,0:POKE=PO
51 1510 POKE=POKE 116,0:POKE=PO
52 1520 POKE=POKE 117,0:POKE=PO
53 1530 POKE=POKE 118,0:POKE=PO
54 1540 POKE=POKE 119,0:POKE=PO
55 1550 POKE=POKE 120,0:POKE=PO
56 1560 POKE=POKE 121,0:POKE=PO
57 1570 POKE=POKE 122,0:POKE=PO
58 1580 POKE=POKE 123,0:POKE=PO
59 1590 POKE=POKE 124,0:POKE=PO
60 1600 POKE=POKE 125,0:POKE=PO
61 1610 POKE=POKE 126,0:POKE=PO
62 1620 POKE=POKE 127,0:POKE=PO
63 1630 POKE=POKE 128,0:POKE=PO
64 1640 POKE=POKE 129,0:POKE=PO
65 1650 POKE=POKE 130,0:POKE=PO
66 1660 POKE=POKE 131,0:POKE=PO
67 1670 POKE=POKE 132,0:POKE=PO
68 1680 POKE=POKE 133,0:POKE=PO
69 1690 POKE=POKE 134,0:POKE=PO
70 1700 POKE=POKE 135,0:POKE=PO
71 1710 POKE=POKE 136,0:POKE=PO
72 1720 POKE=POKE 137,0:POKE=PO
73 1730 POKE=POKE 138,0:POKE=PO
74 1740 POKE=POKE 139,0:POKE=PO
75 1750 POKE=POKE 140,0:POKE=PO
76 1760 POKE=POKE 141,0:POKE=PO
77 1770 POKE=POKE 142,0:POKE=PO
78 1780 POKE=POKE 143,0:POKE=PO
79 1790 POKE=POKE 144,0:POKE=PO
80 1800 POKE=POKE 145,0:POKE=PO
81 1810 POKE=POKE 146,0:POKE=PO
82 1820 POKE=POKE 147,0:POKE=PO
83 1830 POKE=POKE 148,0:POKE=PO
84 1840 POKE=POKE 149,0:POKE=PO
85 1850 POKE=POKE 150,0:POKE=PO
86 1860 POKE=POKE 151,0:POKE=PO
87 1870 POKE=POKE 152,0:POKE=PO
88 1880 POKE=POKE 153,0:POKE=PO
89 1890 POKE=POKE 154,0:POKE=PO
90 1900 POKE=POKE 155,0:POKE=PO
91 1910 POKE=POKE 156,0:POKE=PO
92 1920 POKE=POKE 157,0:POKE=PO
93 1930 POKE=POKE 158,0:POKE=PO
94 1940 POKE=POKE 159,0:POKE=PO
95 1950 POKE=POKE 160,0:POKE=PO
96 1960 POKE=POKE 161,0:POKE=PO
97 1970 POKE=POKE 162,0:POKE=PO
98 1980 POKE=POKE 163,0:POKE=PO
99 1990 POKE=POKE 164,0:POKE=PO

```

This code starts at 49132 and has four features:
1 Accesses the map
2 Draws the bit map, set up the

```

00 1000 POKE=POKE 165,0:POKE=PO
01 1010 POKE=POKE 166,0:POKE=PO
02 1020 POKE=POKE 167,0:POKE=PO
03 1030 POKE=POKE 168,0:POKE=PO
04 1040 POKE=POKE 169,0:POKE=PO
05 1050 POKE=POKE 170,0:POKE=PO
06 1060 POKE=POKE 171,0:POKE=PO
07 1070 POKE=POKE 172,0:POKE=PO
08 1080 POKE=POKE 173,0:POKE=PO
09 1090 POKE=POKE 174,0:POKE=PO
10 1100 POKE=POKE 175,0:POKE=PO
11 1110 POKE=POKE 176,0:POKE=PO
12 1120 POKE=POKE 177,0:POKE=PO
13 1130 POKE=POKE 178,0:POKE=PO
14 1140 POKE=POKE 179,0:POKE=PO
15 1150 POKE=POKE 180,0:POKE=PO
16 1160 POKE=POKE 181,0:POKE=PO
17 1170 POKE=POKE 182,0:POKE=PO
18 1180 POKE=POKE 183,0:POKE=PO
19 1190 POKE=POKE 184,0:POKE=PO
20 1200 POKE=POKE 185,0:POKE=PO
21 1210 POKE=POKE 186,0:POKE=PO
22 1220 POKE=POKE 187,0:POKE=PO
23 1230 POKE=POKE 188,0:POKE=PO
24 1240 POKE=POKE 189,0:POKE=PO
25 1250 POKE=POKE 190,0:POKE=PO
26 1260 POKE=POKE 191,0:POKE=PO
27 1270 POKE=POKE 192,0:POKE=PO
28 1280 POKE=POKE 193,0:POKE=PO
29 1290 POKE=POKE 194,0:POKE=PO
30 1300 POKE=POKE 195,0:POKE=PO
31 1310 POKE=POKE 196,0:POKE=PO
32 1320 POKE=POKE 197,0:POKE=PO
33 1330 POKE=POKE 198,0:POKE=PO
34 1340 POKE=POKE 199,0:POKE=PO
35 1350 POKE=POKE 200,0:POKE=PO
36 1360 POKE=POKE 201,0:POKE=PO
37 1370 POKE=POKE 202,0:POKE=PO
38 1380 POKE=POKE 203,0:POKE=PO
39 1390 POKE=POKE 204,0:POKE=PO
40 1400 POKE=POKE 205,0:POKE=PO
41 1410 POKE=POKE 206,0:POKE=PO
42 1420 POKE=POKE 207,0:POKE=PO
43 1430 POKE=POKE 208,0:POKE=PO
44 1440 POKE=POKE 209,0:POKE=PO
45 1450 POKE=POKE 210,0:POKE=PO
46 1460 POKE=POKE 211,0:POKE=PO
47 1470 POKE=POKE 212,0:POKE=PO
48 1480 POKE=POKE 213,0:POKE=PO
49 1490 POKE=POKE 214,0:POKE=PO
50 1500 POKE=POKE 215,0:POKE=PO
51 1510 POKE=POKE 216,0:POKE=PO
52 1520 POKE=POKE 217,0:POKE=PO
53 1530 POKE=POKE 218,0:POKE=PO
54 1540 POKE=POKE 219,0:POKE=PO
55 1550 POKE=POKE 220,0:POKE=PO
56 1560 POKE=POKE 221,0:POKE=PO
57 1570 POKE=POKE 222,0:POKE=PO
58 1580 POKE=POKE 223,0:POKE=PO
59 1590 POKE=POKE 224,0:POKE=PO
60 1600 POKE=POKE 225,0:POKE=PO
61 1610 POKE=POKE 226,0:POKE=PO
62 1620 POKE=POKE 227,0:POKE=PO
63 1630 POKE=POKE 228,0:POKE=PO
64 1640 POKE=POKE 229,0:POKE=PO
65 1650 POKE=POKE 230,0:POKE=PO
66 1660 POKE=POKE 231,0:POKE=PO
67 1670 POKE=POKE 232,0:POKE=PO
68 1680 POKE=POKE 233,0:POKE=PO
69 1690 POKE=POKE 234,0:POKE=PO
70 1700 POKE=POKE 235,0:POKE=PO
71 1710 POKE=POKE 236,0:POKE=PO
72 1720 POKE=POKE 237,0:POKE=PO
73 1730 POKE=POKE 238,0:POKE=PO
74 1740 POKE=POKE 239,0:POKE=PO
75 1750 POKE=POKE 240,0:POKE=PO
76 1760 POKE=POKE 241,0:POKE=PO
77 1770 POKE=POKE 242,0:POKE=PO
78 1780 POKE=POKE 243,0:POKE=PO
79 1790 POKE=POKE 244,0:POKE=PO
80 1800 POKE=POKE 245,0:POKE=PO
81 1810 POKE=POKE 246,0:POKE=PO
82 1820 POKE=POKE 247,0:POKE=PO
83 1830 POKE=POKE 248,0:POKE=PO
84 1840 POKE=POKE 249,0:POKE=PO
85 1850 POKE=POKE 250,0:POKE=PO
86 1860 POKE=POKE 251,0:POKE=PO
87 1870 POKE=POKE 252,0:POKE=PO
88 1880 POKE=POKE 253,0:POKE=PO
89 1890 POKE=POKE 254,0:POKE=PO
90 1900 POKE=POKE 255,0:POKE=PO
91 1910 POKE=POKE 256,0:POKE=PO
92 1920 POKE=POKE 257,0:POKE=PO
93 1930 POKE=POKE 258,0:POKE=PO
94 1940 POKE=POKE 259,0:POKE=PO
95 1950 POKE=POKE 260,0:POKE=PO
96 1960 POKE=POKE 261,0:POKE=PO
97 1970 POKE=POKE 262,0:POKE=PO
98 1980 POKE=POKE 263,0:POKE=PO
99 1990 POKE=POKE 264,0:POKE=PO

```

columns and turn on bit map mode. It has two forms:
High resolution mode SYS 49132,0,C1,C1
Low resolution mode SYS 49132,0,C1,C2

C1 = paper colour, C2 = ink colour

Multicolour mode SYS 49132,1,C0,C1,C2,C3

C0 = paper colour

2 Write to test mode

This returns you to the normal text screen at its original position. SYS 49130

1 Draw point

This draws the points at X,Y with the specified pen. SYS 49130,X,Y,PEN where

PEN = 0 draws the point in paper colour, or 1 erases the point

PEN = 1 draws the point in ink 1

PEN = 2 draws the point in ink 2

PEN = 3 draws the point in ink 3

In high resolution mode, X must be in the range 0 to 319. In multicolour mode, X must be in the range 0 to 159.

In colour mode, Y must be in the range 0 to 159.

In order to keep the routine as short as possible, I have omitted any range checking of the co-ordinates. If you use values outside the allowed range a crash may occur.

4 Turn on bit map

Without changing a SYS 49131, MODE MODE=0, high resolution MODE=1, in multicolour

So that you don't lose any memory for Basic, the bit map is placed behind the Kernel ROM and service chip

Listing 5 is a simple demonstration.

```

LISTING 5
00 1000 POKE=POKE 165,0:POKE=PO
01 1010 POKE=POKE 166,0:POKE=PO
02 1020 POKE=POKE 167,0:POKE=PO
03 1030 POKE=POKE 168,0:POKE=PO
04 1040 POKE=POKE 169,0:POKE=PO
05 1050 POKE=POKE 170,0:POKE=PO
06 1060 POKE=POKE 171,0:POKE=PO
07 1070 POKE=POKE 172,0:POKE=PO
08 1080 POKE=POKE 173,0:POKE=PO
09 1090 POKE=POKE 174,0:POKE=PO
10 1100 POKE=POKE 175,0:POKE=PO
11 1110 POKE=POKE 176,0:POKE=PO
12 1120 POKE=POKE 177,0:POKE=PO
13 1130 POKE=POKE 178,0:POKE=PO
14 1140 POKE=POKE 179,0:POKE=PO
15 1150 POKE=POKE 180,0:POKE=PO
16 1160 POKE=POKE 181,0:POKE=PO
17 1170 POKE=POKE 182,0:POKE=PO
18 1180 POKE=POKE 183,0:POKE=PO
19 1190 POKE=POKE 184,0:POKE=PO
20 1200 POKE=POKE 185,0:POKE=PO
21 1210 POKE=POKE 186,0:POKE=PO
22 1220 POKE=POKE 187,0:POKE=PO
23 1230 POKE=POKE 188,0:POKE=PO
24 1240 POKE=POKE 189,0:POKE=PO
25 1250 POKE=POKE 190,0:POKE=PO
26 1260 POKE=POKE 191,0:POKE=PO
27 1270 POKE=POKE 192,0:POKE=PO
28 1280 POKE=POKE 193,0:POKE=PO
29 1290 POKE=POKE 194,0:POKE=PO
30 1300 POKE=POKE 195,0:POKE=PO
31 1310 POKE=POKE 196,0:POKE=PO
32 1320 POKE=POKE 197,0:POKE=PO
33 1330 POKE=POKE 198,0:POKE=PO
34 1340 POKE=POKE 199,0:POKE=PO
35 1350 POKE=POKE 200,0:POKE=PO
36 1360 POKE=POKE 201,0:POKE=PO
37 1370 POKE=POKE 202,0:POKE=PO
38 1380 POKE=POKE 203,0:POKE=PO
39 1390 POKE=POKE 204,0:POKE=PO
40 1400 POKE=POKE 205,0:POKE=PO
41 1410 POKE=POKE 206,0:POKE=PO
42 1420 POKE=POKE 207,0:POKE=PO
43 1430 POKE=POKE 208,0:POKE=PO
44 1440 POKE=POKE 209,0:POKE=PO
45 1450 POKE=POKE 210,0:POKE=PO
46 1460 POKE=POKE 211,0:POKE=PO
47 1470 POKE=POKE 212,0:POKE=PO
48 1480 POKE=POKE 213,0:POKE=PO
49 1490 POKE=POKE 214,0:POKE=PO
50 1500 POKE=POKE 215,0:POKE=PO
51 1510 POKE=POKE 216,0:POKE=PO
52 1520 POKE=POKE 217,0:POKE=PO
53 1530 POKE=POKE 218,0:POKE=PO
54 1540 POKE=POKE 219,0:POKE=PO
55 1550 POKE=POKE 220,0:POKE=PO
56 1560 POKE=POKE 221,0:POKE=PO
57 1570 POKE=POKE 222,0:POKE=PO
58 1580 POKE=POKE 223,0:POKE=PO
59 1590 POKE=POKE 224,0:POKE=PO
60 1600 POKE=POKE 225,0:POKE=PO
61 1610 POKE=POKE 226,0:POKE=PO
62 1620 POKE=POKE 227,0:POKE=PO
63 1630 POKE=POKE 228,0:POKE=PO
64 1640 POKE=POKE 229,0:POKE=PO
65 1650 POKE=POKE 230,0:POKE=PO
66 1660 POKE=POKE 231,0:POKE=PO
67 1670 POKE=POKE 232,0:POKE=PO
68 1680 POKE=POKE 233,0:POKE=PO
69 1690 POKE=POKE 234,0:POKE=PO
70 1700 POKE=POKE 235,0:POKE=PO
71 1710 POKE=POKE 236,0:POKE=PO
72 1720 POKE=POKE 237,0:POKE=PO
73 1730 POKE=POKE 238,0:POKE=PO
74 1740 POKE=POKE 239,0:POKE=PO
75 1750 POKE=POKE 240,0:POKE=PO
76 1760 POKE=POKE 241,0:POKE=PO
77 1770 POKE=POKE 242,0:POKE=PO
78 1780 POKE=POKE 243,0:POKE=PO
79 1790 POKE=POKE 244,0:POKE=PO
80 1800 POKE=POKE 245,0:POKE=PO
81 1810 POKE=POKE 246,0:POKE=PO
82 1820 POKE=POKE 247,0:POKE=PO
83 1830 POKE=POKE 248,0:POKE=PO
84 1840 POKE=POKE 249,0:POKE=PO
85 1850 POKE=POKE 250,0:POKE=PO
86 1860 POKE=POKE 251,0:POKE=PO
87 1870 POKE=POKE 252,0:POKE=PO
88 1880 POKE=POKE 253,0:POKE=PO
89 1890 POKE=POKE 254,0:POKE=PO
90 1900 POKE=POKE 255,0:POKE=PO
91 1910 POKE=POKE 256,0:POKE=PO
92 1920 POKE=POKE 257,0:POKE=PO
93 1930 POKE=POKE 258,0:POKE=PO
94 1940 POKE=POKE 259,0:POKE=PO
95 1950 POKE=POKE 260,0:POKE=PO
96 1960 POKE=POKE 261,0:POKE=PO
97 1970 POKE=POKE 262,0:POKE=PO
98 1980 POKE=POKE 263,0:POKE=PO
99 1990 POKE=POKE 264,0:POKE=PO

```

Spines

Spines are probably the thing which makes games worth the investment. To those of you who don't know, a spine is a movable block of 256 pixels arranged in a block of 21 rows of

34. The design is stored in a similar way in characters in that each row can be represented by 4 bytes with the whole design occupying 63 bytes. These designs are stored as a sequence of blocks in the given bank. The address of any given sprite block is given by

ADDRESS = (BANK*16384) + (BLOCK*1024)

Specifying a sprite design

The next step is to tell the VIC which pattern block is to be used. A maximum of eight sprites are possible and each has a pointer. These pointers are located above the screen memory and can be found by

POINTER ADDRESS = SCREEN ADDRESS + 1024 + SPRITE NO

where SPRITE NO is from 0 to 7.

A pointer up the screen at 1024 is the pointer for sprite 0 is at 1024+1024=2048. To initiate VIC which pattern to use, you simply POKE the block number into the pointer eg to set sprite 1 to pattern 45

POKE 2048, 45

Turning on a Sprite

Whether or not a sprite is visible is determined by VIC register 31269. Each bit of this register controls a sprite. To activate sprite 5N use

POKE 31269, PEEK(31269) OR (2 * 5N)

To turn off sprite 5N use

POKE 31269, PEEK(31269) AND (255 - 2 * 5N)

Expanded Sprites

Sprites can be expanded in both directions to give four possible sizes. These are controlled by two registers. To expand sprite 5N in the X direction use

POKE 31277, PEEK(31277) OR (2 * 5N)

To reduce it again use

POKE 31277, PEEK(31277) AND (255 - 2 * 5N)

To expand sprite 5N in the Y direction use

POKE 31271, PEEK(31271) OR (2 * 5N)

To reduce it again use

POKE 31271, PEEK(31271) AND (255 - 2 * 5N)

Colours

Each sprite has a colour register. This is given by REGISTER = 31287 + SPRITE NO

This is used to specify the colour of high resolution sprites.

In multi-colour sprites the colours are selected by the usual bit plane, see Table 1.

The eight colour registers 31276-control the colour mode.

To set a sprite 5N to multi-colour mode use

POKE 31276, PEEK(31276) OR (2 * 5N)

To set sprite 5N to high resolution mode use

POKE 31276, PEEK(31276) AND (255 - 2 * 5N)

Positioning a Sprite

The positioning of any given sprite on the screen is defined by an X,Y co-ordinate. The X co-ordinate can range from 0 to 512 and Y co-ordinate from 0 to 256. Each sprite has a dedicated pair of registers. The first holds part of the X position and the other holds the Y co-ordinate. They can be found from

X Register = 31248 + 5N*2

and the Y register is found from

Y Register = 31249 + 5N*2

The X position is defined in two parts.

Most significant byte (msb) = INT(XPOS/256)

Table 4

BIT PAIR	COLOUR SOURCE
0 0	Screen colour
0 1	Register 31285
1 0	Colour register
1 1	Register 31286

Selecting Colour Mode

Least significant byte (lsb) = XPOS - msb*256

Register 31284 holds the odd details, one bit per sprite.

So to position a sprite you use

POKE XREG,LSB
POKE YREG,Y

If msb=1 then POKE 31284, PEEK(31284) OR 2 * 5N

If msb=0 then POKE 31284, PEEK(31284) AND (255 - 2 * 5N)

Priorities

Each sprite has a priority which decides whether it appears in front of or behind the characters on the screen. Register 31275 decides this, one bit per sprite.

To put sprite 5N behind the characters use

POKE 31275, PEEK(31275) OR (2 * 5N)

To put sprite 5N in front of the characters use

POKE 31275, PEEK(31275) AND (255 - 2 * 5N)

That's quite a considerable workload to introduce to simple programming. Listing 4 gives the elegant machine code package.

This code has four routines

Setup Sprite

SPS 49466 SP,TYPE,COLOUR,
XEXP,PRIORITY,COLOUR1,
COLOUR2

where SP=sprite number (0-8)
TYPE=0=High resolution, 1=Multi-colour
COLOUR=High resolution colour
XEXP=1=X direction, 0=does not expand X direction
YEXP=1=Y direction, 0=does not expand Y direction
PRIORITY=0=behind background,

Sprite Editor

Any serious games programmer needs a sprite editor to aid design. This program should make working with sprites easier and more effective

By Brian Rhodes

Serious programmers are always looking for new utilities to enable them to progress on their limited budget. A sprite editor is an invaluable asset when it comes to designing and manipulating sprites. Here we present an editor which we hope will answer all your needs.

Instructions

F Function
SH Shift
m/c Multi-colour mode
CRSR Keys: Move cursor
SPACE Plot/replace in m/c mode
 Plot: select colour but replace all colours
 R Plot: replace colour regardless of m/c mode
 Z Plot: m/c #0 in m/c mode only
 X Plot: m/c #1 in m/c mode only
DEL Unplot all colours (Any mode)
 The shifted version of the above also work so shift lock can be used
 F Next sprite
 — Previous sprite
 0 Delay before + or — (used in animation)
 + Increases delay
 — Reduces delay
 R Jump forward 10 sprites
 Shift R Jump back 10 sprites
 P Progress (copies previous sprite to next location and advances)
 A? Auto advance CRSR
 CLR shifted: Draw sprite
 HCRSR: Home CRSR
 R Rotate (works in m/c)
 Q Quit (returns to line 57540/5754076 RETURN routine)

00 Scroll mode. The CRSR line to position sprite SPACE over
 F Fill sprite
 + Flip (rotate around horizontal axis)
 + Mirror (reverse around vertical axis)
 — Equates, because of the nature of sprites, pressing | | m/c sprites swap the colours. Pressing "" restores the correct colours
 C Copy sprite
 F? Toggle between m/c and normal mode
 * Change colours
 F# Background/border colour
 F# Sprite colour
 F# m/c #0 (only in m/c mode)
 F? m/c #1 (only in m/c mode) Also set mode in multi sprite mode
 Shift F-keys map back words
 B Data output
 F? Data output
 F? Plotout
 F# Numerical Plotout
 F# Sprites plotted (normal mode only)
 E Kill sprite advance. Toggles modes A, B and off
 00 All sprites follow grid
 A Only one sprite follows grid
 B No sprites follow grid
 M Multi sprite mode. Enables objects of several sprites to be constructed
 SPACE? Draw mode
 CRSR Keys: Move sprite
 Numbers 0-7: Change controlled sprite
 F? Deletes sprites 0-7
 F? Toggle m/c and normal mode
 F Next sprite

— Previous sprite
 <— Increment colour
 >— Decrement colour (Don't shift and >)
 + Expand vertically
 — Expand horizontally

Notes

- 1) All numbers wrap-around (i.e. when they get to 255 they start to 0) and the other way) as at 15 when using colours
- 2) Entering null values (0 or "") normally sets present mode
- 3) When using multi sprites be careful that colour change and mode change do not spoil multi sprite parameters

Additional Notes

These are some additional notes on the use of the Sprite Editor. They are meant to supplement and expand upon the instructions and explain in detail all available functions.

There are two forms of the sprite editor provided, each occupying a different area of memory.

- 1) Entitled %SPRITE ED:16080 (2 blocks) this is a single file version loading from 16080 to 16400 and named by the command %SYS 14576 = RETURN = 164000.
- 2) Entitled %CODE 1 CB00-1000 (21 blocks) and %CODE 2 6000-7000 (11 blocks) this is a two file version loading between 6000-67100 and 6000-60000 and is run by the command %SYS 48132 = RETURN = 600000.

Parameter Screen

When the Program is run, the first thing that will be seen is the parameter screen. The screen will clear and the words "PARAMETER INPUT" will appear at the top of the screen along with a copyright message. You will then be asked to input a number of variables such as Colour, Start Sprites etc, and a cursor will appear beside the present value; if this value is correct then just press Return; if not then use delete and the numerical keys to change it. The questions that will be asked are as follows:

1. **Start Sprites:** This is the sprite that will first appear on the screen. Sprites numbers are identical to the number FORTRN is 2848 to display, sprites normally it is undesirable to use sprites below 128 but for more information see the Commodore manual.

2. **Background Colour:** This is the colour of the background on which the sprites will be displayed.

3. **Normal Mode Colour 1:** This is the colour of any normal sprite.

4. **MC mode Colour 1:** This is the colour that will be given to any multi-coloured sprite on its basic colour. **MC Colour 2-8:** This is the colour that will be given to MC 2-8 of any multi-coloured sprite.

MC colour 9-16: Likewise for MC 9-16.

5. **Advance/Retrace Interval:** This determines the number of sprites that will be advanced or retraced for every pixel of 4-27.

6. **Highest Sprite Before Wraparound:** When on this sprite pixel 0 and the program will go to the lowest sprite.

7. **Lowest Sprite Before Wraparound:** When on this sprite, pixel -1 and program will go to the highest sprite.

8, 9, 10 or 11 are given each value as it is impossible the program will return to question 3.

Editing Screen

When all the variables have been defined the editing screen will appear. This can be split into three sections:

- The editing grid
- The sprite display area
- The control/input line

The editing grid is a block of squares on the left of the screen which displays an enlarged version of the current sprite. A flashing cursor will also appear on the grid and this indicates the position of any change to the sprite.

To the right of this is a small coloured according to the background colour. It is on this area that the defined sprites appear.

The top line and the space above the display area is the control/input area where instructions or requests will appear.

The standard editing commands are given in the instructions. Most of the commands are straightforward but for the more complicated ones a more detailed description is given below.

0 - This controls the time interval between changing the sprite number and control being returned to the keyboard. This is useful on animating sprites where the uppermost lower sprite wraparound limits can be set to the limits of the animated sprite and + or - held down to cycle through the images. Varying the delay value changes the speed of the animation. 0 is the maximum delay, 255 the minimum.

4 - **Cursor up/down/left/right:** These allow a pointer cursor movement after any point has been plotted. When selected a 9 pixel grid will appear and below that is the present value. The keys 0 to 3 now select the direction of the movement. Any UNPLOT command will set it in the opposite direction. A value of 8 times auto advance off.

8 - **Sprite print-out:** Pressing this key,

will print out the currently edited sprite on an MP5884 printer. The protocol will be in normal lower case only.

D - **Draw output:** Pressing this gives access to a sub menu.

Q - **Quit mode**

1 - **Write storage on disk:** This gives access to a standard Load/Save dialog.

2 - **Duplex:** This gives a numerical screen display of the data that goes to make up a particular sprite.

9 - **Mathematical print-out:** This is the same as above but to printer (MP5884).

Multi Sprite Mode

It is possible using the editor to create images using more than one sprite. To do this the sprite advance mechanism must be turned off. This prevents the sprites from changing when + or - is pressed and is achieved by pressing K to enter "kill mode". An A will appear at the top of the screen. Press R again and B will appear. Pressing it a third time will make the sprite disappear.

Kill mode A means that only one sprite number one will follow the main grid and in kill mode B no sprites will follow the grid.

The number keys 1-7 change between sprites and the cursor keys move them. SPACEL moves the position on or off and UP/ARROW and DOWN/ARROW expand the sprite in the x and y directions. (1 and 1) change the sprite colours while + and - change sprite numbers and 0 changes between multi and normal mode.

Normally with four sprites are visible but pressing IT brings the other sprites on. The 0 menu will become painting a square will reset the positions of sprites 3, 6 and 7.

N.B. When using multi-sprite mode be very careful about changing mode and colours of the sprites since it will affect all sprites and may destroy the screen.

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Please save LISTINGS before executing any program

PROGRAM: SPRITE LOADER 1

00	1	REM TO CHANGE SPRITE ATTRS	00	10	CL-255	AN=00	SA=0710	76,80,177,76,188,177,76,84,1
01	2	LOAD AND						77,74,1875
02	3	REM RUN THIS PROGRAM THEN	50	20	FOR L=0 TO 8L-0-0 FOR S=	10	40	76,80,177,76,188,177,76,84,1
03	4	LOAD AND RUN			0 TO 255 FOR S=0 TO 255			77,74,1875
04	5	REM SPRITE LOADER 2 NOW L	A0	30	IF L=0 THEN			76,80,177,76,188,177,76,84,1
05	6	LOAD AND RUN			IF L=0 THEN			77,74,1875
06	7	REM EDITOR SAVE TO CREATE			IF L=0 THEN			76,80,177,76,188,177,76,84,1
07	8	SPRITE			IF L=0 THEN			77,74,1875
08	9	REM CHANGING VERSION OF THE	60	40	IF L=0 THEN			76,80,177,76,188,177,76,84,1
09	10	EDITOR	70	50	IF L=0 THEN			77,74,1875

CD PROGRAM

10	100 DATA 117,113	81	100 DATA 188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000	51	100 DATA 188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,3
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ON PROGRAM

[illegible][illegible][illegible]

GAL PROGRAM

[illegible]



Cedit 64

A powerful character editor for C84 owners.

By Brian Rhodes

The C84 computer may have the ability to use characters that you design yourself, however, when you actually come to trying to design your own characters you will no doubt find it a bit of a chore. CREDIT 64 is a powerful character editor that takes all of the hard work out of designing and managing your own character sets.

Getting It In

The program is presented in three sections. Type each program in separately and store them on tape or disk. The program CHAR ED M/C LOAD presents a new program and saves the tape/tape or disk. If you consider that this new program should be stored on the cassette after the CHARBAS program. The actual order of the programs on cassette should be:

CHAR ED LOADER
CHAR CODE (created by CHAR ED M/C LOAD)
CHAR BASIC

If you are using cassettes then do make sure that you make the changes as indicated with the listings.

CRSE Key	Move cursor
SPACE	Plot/corrupt
B	Plot sprite colour
B	Plot m/c #0 as m/c mode only
B	Plot m/c #1 as m/c mode only
DEL	UnPlot as m/c mode
+	New character
-	Previous character
BACK ARROW	Program (page & address)
A	Auto advance
W	Widescreen screen
0	Jump to character number

B	Change grid between m/c and normal mode	B	Change grid between m/c and normal mode
M	Change display between m/c and normal modes	B	Change grid between m/c and normal mode
R	Change between defined characters and standard command-line characters. New loader-CRM character set. Graphics-Defined character set.	B	Change grid between m/c and normal mode
R	Reset	B	Change grid between m/c and normal mode
Q	Quit	B	Change grid between m/c and normal mode
H	Horizontal text wrap (m/c)	B	Change grid between m/c and normal mode
V	Vertical text wrap (m/c)	B	Change grid between m/c and normal mode
T	Toggle	B	Change grid between m/c and normal mode
UP ARROW	Scroll mode	B	Change grid between m/c and normal mode
	Fit to left of cursor	B	Change grid between m/c and normal mode
	Fit to right of cursor	B	Change grid between m/c and normal mode
	Enter character	B	Change grid between m/c and normal mode
CLR	Home cursor	B	Change grid between m/c and normal mode
HOME	Swap	B	Change grid between m/c and normal mode
S	Copy	B	Change grid between m/c and normal mode
R	Change text line	B	Change grid between m/c and normal mode
C	Change colour	B	Change grid between m/c and normal mode
L	State	B	Change grid between m/c and normal mode
+	Draw state	B	Change grid between m/c and normal mode
B	Block manipulation	B	Change grid between m/c and normal mode
B	Print characters for Scratch Pad	B	Change grid between m/c and normal mode
B	Enter Scratch-pad mode. This enables the user to create screens built up out of UDGs. In this mode the cursor is controlled by the cursor keys and when any key is pressed then the	B	Change grid between m/c and normal mode
B		B	Change grid between m/c and normal mode

character will appear at the cursor position. The exception to this are the numbers keys which have preset characters assigned to them. Other keys have characters assigned to them. To take a snapshot of the screen and store it in memory. Enter the scratch-pad and goes to the main editing screen. Any alterations made to the screen since it was last saved will be lost. Shows the screen then exits to the editor. Allows the user to change the preset characters and is equivalent to pressing "V" in edit mode. Changes between m/c and normal character printing. The cursor will change colour to indicate m/c mode. Resets the last screen that was saved. Changes between CRM character set and the user defined one. Changes to reverse printing. Moves the cursor to the top left of the screen. Clears the screen.

[illegible]

YOUTH COMMUNICATIONS may 1987

[illegible]

Next month we will take a closer look at the function of each component and what are its changes for some years.

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[illegible][illegible]

Commission 04/002	037 00
Commission 04/003	038 00
Commission 05/001	039 00
Commission 05/002	040 00

1. <i>Agave americana</i> L.	1. <i>Agave americana</i> L.
2. <i>Agave americana</i> L.	2. <i>Agave americana</i> L.

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

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Spanner in the Works

If you rely heavily on your computer for business or leisure activities, then a breakdown can be infuriating. Here are a few tips on simple fault finding and repairs

By Mike Roberts

The entire range of Commodore computers set high standards in design, production and reliability.

All the hardware is built up to a specification rather than to a price, unlike one or two of its competitors.

Opening up any Commodore computer will show a large number of integrated circuits which are the chips that make the computer work. However, there are usually the first ones to produce problems when anything serious malfunctions in your computer.

There can be other reasons for your machine's failure and many are minor. If your guarantee has expired, you may be faced with a hefty bill.

However, all is not lost. You can usually trace the cause of a breakdown to one or more of the ICs. Replace the chip and the problem is solved.

Following a simple check list, you can pinpoint when it comes to repair

Your Options

Imagine a nightmare situation. You've got your C64, plug everything in, and connect the screen, turn it all on, and nothing! The screen is blank and the keyboard dead.

What can you do?

Firstly, you should check the LED on the top of the machine. If this is off then the power supply has probably blown. This is the only instance (excepting the unlikely event of the LED fusing) in which the LED will not light up. If the LED is alright, then you must look the computer

internals of the machine. Remember that the LED power is tapped from the supply before the fuse. The computer takes its power after the fuse. So this is the first thing that must be checked. If it has blown then you've located the problem, and you can fix it quite simply.

The fuse only costs a few pence and is of the type 441, 1A0, 500 amp 250V. It is located on the right hand side near the power socket close to the regulating and rectifying circuitry. If the fuse is whole, then the only other explanation is that a section of the circuitry is blown. But this is rare and you would usually get the damage as blackened fused components. If this is the case then you need professional help.

Chip Testing

If the computer is just behaving oddily

Going Inside

First, connect a tape deck, insert a tape in the front cassette, and press the reset/stop. If the tape is dead then so is the computer.

The next step is to check the

then you need to determine which chip is causing the trouble. A lack of screen display usually means that the video output circuitry has blown, as this involves a lot of discrete components. You will also need professional help for this. The chip can be tested by plugging it into a friend's C64 to see if the same problem re-occurs.

This technique of using another C64 to test chips is relatively safe, but be careful not to force chips or bend pins. Make sure you switch your board by touching shielding metal before handling any components.

If your video circuitry is OK, then any other problem will generate a screen display from which you may be able to diagnose a fault.

Look on the screen with a regular pattern and an underlying picture of the correct display indicates a RAM problem. Professional service again is the friend.

Absolute silence obviously indicates a dead sound chip. The sound circuitry is very robust, and it is usually the chip that is the first to go.

If the ROMs fail, then you will be left with a blink screen. Although this is very unlikely as there are safeguards

the most reliable chips in the machine. A dead processor will also exhibit symptoms similar to this.

The remaining main chips are the I/O 6559 chips. There are two types of these. U1 handles the keyboards and joysticks. Just being typed on or the screen as well as you turn it on, or a dead keyboard, indicates either a fault with this chip or its support circuitry. Alternatively, older machines may have their keyboards full of dust. Cleaning will solve the problem.

The other chip, U2, handles most of the main I/O with the user port and serial I/O.

The problem here is that it is difficult to distinguish whether the fault lies with the chip or U3 or the device currently in use eg the disk drive.

Summing Up

If you follow these simple tips you may be able to rectify a small fault yourself, or at least have some idea of what has malfunctioned.

If the fault is more complex, you need to find a good repair shop. Inside

look it up before to see a large organisation rather than a one horse outfit, and preferably one that specialises in Commodore computers.

Repair Timeline

I. Bateman, Tel 0206 69434 (phone only)

MCET Services 67/68 Spencer, 13 Albert Street, Manchester, M16 7JH Tel 0627 33262

Frangis Electronics Mr Pedro, Unit 4 15 Springfield Warren, Middlesbrough, Tel 01 870 7768

Shelley Mr Jim Korman, 14-17 Eastern Exchange, Southend-on-Sea, Essex, Tel 0702 616733

GC Bates and Sons, Mr Bruce, 26 Rushmore Road, Rushmore, Bucks MK1 7NQ Tel 02958 41696

Complan Computer Centre, Don Swannell, 25 Bradenwood Road, Thurston Heath, Essex, CM4 1U

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